RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

PUBLISHED EVERY FRIDAY BY THE RAILROAD GAZETTE AT 83 FULTON STREET, NEW YORK
BRANCH OFFICES AT 375 OLD COLONY BUILDING, CHICAGO, AND QUEEN ANNE'S CHAMBERS, WESTMINSTER, LONDON

EDITORIAL ANNOUNCEMENTS.

THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It contains selected reading pages from the Railroad Gazette, together with additional British and foreign matter, and is issued under the name Railway Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

CONTENTS

VOL. XLII., No. 25. FRIDAY, JUNE 21, 1907.

In the appointment of two experienced agents as inspectors of station service, and two experienced yardmasters as inspectors of yards, the general manager of the Baltimore & Ohio has wisely provided that these new officers shall report to himself direct. An inspector must be a good deal of a fault finder and it is of the first importance that he shall be free to name the person who is at fault—and that may be the superintendent. We hope that these inspectors have four pairs of eyes apiece, for if the B. & O. is at all like several other big roads which we could name there will be a great variety of things which an inspector ought to see. Moreover, the plan of having inspectors report to the general manager should not be looked upon as a reflection on the character of the officers below him. So far as we know, the superintendents of the B. & O. are as efficient as any in the world. But unless they are decidedly better than any others in America, the inspectors can do them a service, especially by telling Superintendent *A* of the good practices, unknown to *A*, which are to be seen on Division *B*. In commending the general manager for what he has done we do not wish to discourage any superintendent whose general manager persistently neglects to do this favor for the superintendents. Any superintendent who can find two or three men of the right sort, and the money to pay their salaries, can readily find the faults in his service, without the help of the manager. The grit to cure the faults, when they are discovered, must, in any event, be found without the aid of the general manager!

The vagrancy problem in the United States has been discussed at the National Conference of Charities and Corrections at Minneapolis, and the well known fact that trespassers constitute about half the total number of persons killed on American railroads was made the text of an appeal to the public to cure the barbarous conditions which lead to this result. The other well known fact, that the principal railroads are ready to do their part toward arresting and punishing tramps was also brought out, letters from a number of presidents being read. But the appeal for action to check the drain on society caused by the tramp nuisance appears to have been engineered by someone who does not clearly see the seat of the trouble. According to the press despatches, "efforts are to be made throughout the country to enlist the co-operation of railroads, state boards of charities, local charitable societies and individuals in obtaining more adequate trespass laws and more adequate enforcement of these laws." Why not appeal more directly to the persons who are near enough to the evil to realize its magnitude? These are the local magistrates and police officers. Policemen and constables are lukewarm, or worse, because the police courts do not show hearty approval of their work by inflicting vigorous punishment when tramps are arrested. In some places the police are inefficient from less creditable causes; and in most small cities and all towns the forces are inadequate and are not encouraged to activity by the proper money stimulus; still the excuse that the magistrates undo their work is a general and plausible defense. The magistrates themselves also have a plausible excuse. They let culprits off with easy punishment, or none at all, because they grudge the expense of keeping such a horde of lazy and worthless men in workhouses; and in this reluctance to spend the public money they reflect the opinions of the taxpayers or, at least, they think they do. But where the taxpayers are unduly stingy in this matter the magistrates, realizing the nature and extent of the evil, are the men who ought to enlighten the public; and the National Charities people would do well to direct their agitation that way. Action by local and state charity boards is all well enough, but a single hustling police magistrate who should stir up aldermen, mayors and prosecuting officers, could do ten times as much good, for he could enliven his appeal with the tragic facts of intimate experience with this great blot on society.

The noteworthy comment made by Governor Hughes on his veto of the 2-cent bill, which comment was printed in the News Section of the *Railroad Gazette* last week, was based on three principal grounds: first, the passage of the bill was not preceded by anything like legislative investigation of the subject; second, injustice on the part of railroad corporations toward the public does not justify injustice on the part of the state toward railroad corporations; third, the security of the investors and of employees and the protection of every form of industry and commerce necessitates that railroads should be permitted to operate under conditions which will give fair return for their services. We quote the governor almost word for word in rehearsing these three principles, which are so self-evident

that they need absolutely no explanation. Yet there is scarcely another state in the length and breadth of the Union which is in position to affirm that its anti-railroad legislation of 1907 was enacted on the plain lines of common sense here indicated. A Pennsylvania legislative committee is reported to have said to representatives of the Pennsylvania Railroad during the recent session, "We do not want statistics; we want a 2-cent fare!" Whether it did say so or not, this point of view, extended to cover reciprocal demurrage, provisions that the conductor of a freight train may be fined for failure to carry passengers in the caboose, that a railroad company must be absolutely responsible for freight to destination, and so on through an infinite series of variations, has everywhere manifested itself this spring. It is greatly to be desired, although scarcely to be hoped, that every legislator in every state will read and digest Governor Hughes' observation that if the New York 2-cent bill had become a law, the result would have been that "at a critical time when the interests of all demand that reason and judgment should control in dealing with such matters, we should have abandoned our true line of action and facilitated still wider departures," and also that " in dealing with these questions, democracy must demonstrate its capacity to act upon deliberation and to deal justly." Legislation for revenge is not going to work any better to-day than it worked in the Granger states in the seventies.

Governor Hughes on Saturday last vetoed the train-crew bill, a measure which was even more vicious than the 2-cent fare bill, for it had no substantial purpose whatever, except to please those labor leaders who seem to think that the securing of a law of this kind is the best way to provide positions for more brotherhood brakemen. The New York legislature had followed Indiana, Kansas, Texas and South Dakota in this matter, the same as it followed the western states in the fare legislation, for no other reason, apparently, than that the action of these other states indicated that probably the railroads would peacefully submit. In his veto, quoted below,* the governor clearly shows up the real animus of the movement. Wherever railroads run trains with insufficient crews the damage is mainly a financial one—loss to the company by delays. The damage to the lives or the health of employees, which is the only damage that could possibly justify such an arbitrary law as that here proposed, is too remote and shadowy to be considered. Inconvenience to passengers (by delays to freight trains) is probably a greater grievance than the damage to firemen's health; and to redress this an investigation by the new State Railroad Commission is the proper procedure. The last paragraph of the governor's memorandum, where it speaks of "arbitrary exaction," should remind the brotherhood leaders of the many times that they have extorted from railroad managers rules as vicious as that proposed by this bill—and with as little regard for due process of law.

THE MASTER MECHANICS' CONVENTION.

Again the annual convention of the American Railway Master Mechanics' Association has been held, and, as usually happens, notable and valuable work has been done; notable in that it indicates the trend of opinion and progress, and valuable in the record of achievement that it contains. Prominent among the subjects that were discussed is one that was listed on the program as a topical discussion, but which was so absorbing in its interest that it overran its allotted time and was taken up again the next day with undiminished interest and finally referred to a committee for further report. This all-absorbing topic was presented as an individual paper by two gentlemen who made their bow to the association in this production, and who were so eager to have their paper discussed that they wrote personal letters prior to the meeting to a number of friends asking that something be said. But there was small need of that, for hardly had the president announced the subject before the house for discussion when the ball was thrown and was kept in the air until absolute lack of time compelled closure. And this subject that men were so eager to talk about and learn of was one not of physics and mechanics, but of men, young men, apprentices, and was hung on the system that has been so successfully organized on the New York Central Lines to meet and fill that most crying need of the times, the need for skilled mechanics. The success of this system at the end of the first year of its existence gave an added interest to what would have attracted attention and aroused discussion under any circumstances, and the railroad world is to be congratulated that a system has at last been developed that promises to be of permanent and widespread importance. It possesses the peculiar value that it compels the apprentice to go to school during shop hours, and pays him for so doing, that it looks after his interests and sees that he is taught his trade in the shops and not allowed merely to drift through his time to add another to the list of incompetents at the end, but is aroused to a healthy interest in his life's work from the start.

In the discussion there was commendation of what had been done; words of encouragement and hope of a final and larger success of the scheme; manifestation of an earnest interest to learn all that there was to be learned of the plan, and a recital of personal experience in similar attempts that had been more or less successful. In only two instances did speakers offer adverse criticisms. One stamped the plan as that of a kindly and paternal benevolence; the other thought that while it might afford a fairly satisfactory breeding place for captains and leaders, it would not make workmen. The promptness with which these adverse opinions were contradicted must have been almost startling to those who broached them. It was declared that far from being a benevolent institution, this apprenticeship system of the New York Central was a hard-headed business proposition based on purely commercial principles, and that it was already paying dividends in that the boys were doing more work during their shortened hours than it had been possible to get them to do in the whole day before. The objection that the plan did not tend to make workmen was controverted by the statement that it did, and that past experience goes to corroborate the fact that skill does not produce discontent, and that the man so skilled can and will work at the trade which he has learned. In short, the subject appealed to the interests of all, and it seems likely that the influence of the example that has been set will be far reaching and beneficial in its results.

As a brief record of what has been done and the golden opinions that this improvement has won from all sorts of men in its brief stay among us, the paper on the Walschaert gear was notable, as well as because it is a straw indicating the tendency of present locomotive development. The discussion was brief and was a mere experience meeting, strongly resembling other experience meetings in which the speakers were moved to rise and testify what it had done for them. There was no adverse testimony, no story of backsliding, but a unanimous record of accomplishment. In short, the association has set its seal of approval on this new arrival, and to those who bear in mind the age of the device, the wonder is that recognition has been delayed for so many years, until the recollection comes of the conditions that prevailed until recently, and then—but that is another story.

These two subjects may be taken as the landmarks of the work of the association for the year, and they exceeded all others in the interest aroused. But other examples of improved practice appeared which may be made the subject of investigation in the future, while still others are coming to be accepted as a standard of good if not of common usage. The superheater stands pre-eminent as an example of the latter. The story of the successful introduction of this device on the Canadian Pacific is of more than passing interest, resting on belief in the theoretical accuracy of a system followed by forcing it to a successful consummation through almost insuperable mechanical difficulties. It is a finer story of persistence in the pursuit of an object than appears in the simple statements of the paper that was presented. And, to those who read between the lines, it has a significance far beyond the mere state-

*"This bill provides that it shall be unlawful for any railroad company in the state of New York that runs more than four freight trains in twenty-four hours to run over any part of its road outside of yard limits any freight train composed of more than 20 cars with less than a full crew of six persons, or a light engine without cars without a crew composed of one engineer, one fireman, one conductor, or flagman, when running a distance of ten miles or more from starting point.

"Freight trains are very generally operated with a crew of five persons, and the object of this bill is to compel the employment of an additional brakeman. The necessity for this is said to lie in the fact that without three brakemen the freight trains are insufficiently manned and that the firemen are compelled to leave their places in all kinds of weather to throw switches when the two brakemen are required respectively to go ahead of and behind the train.

"This bill, however, upon the facts developed before me upon the hearing and undisputed is clearly unconstitutional. Such a measure should define the service required with suitable reference to circumstances and conditions so that the law would apply in proper cases and not otherwise. The bill takes no account of the differences between the different roads and parts of roads, in track and switching facilities, and of the fact that what may be necessary in the case of some railroads may be wholly unnecessary in others.

"In the case of the New York Central it was shown that the track and switching facilities on its main lines were of such a character as to make unnecessary the employment of a third brakeman. This was frankly conceded bp supporters of the bill.

"To require the expenditure of a very large amount of money (estimated at several hundred thousand dollars annually), without necessity for the outlay, is simply arbitrary exaction and taking of property without due process of law. The bill does not refer its requirements to any proper standard of necessity or provide any criterion by which its proper application under varying conditions is to be determined. It contains an absolute requirement which, upon the facts conceded before me, cannot be justified."

ment of the fact that the superheater can be applied to a locomotive and be made to show an economy of operation when considered as a whole. It shows a tendency on the part of at least one railroad to take the initiative in the introduction of an improvement. Up to the present time it must be admitted by even the most ardent admirer of American railroads that the great majority of the improvements that have been made have been introduced as the result of the persistent efforts of the supply man and not because the railroad official has been convinced of the scientific soundness of an improvement and then has proceeded to make it a working practical success on his own initiative. Perhaps this experience on the Canadian Pacific will mark the opening of a new era in this respect.

Unfortunately the mechanical stoker is still quiescent and the association is in the attitude of expectant waiting, with nothing to turn to that offers a final solution to the problem of the firing of large engines, though the candidates for favor are still at work with some prospect of ultimate success.

Details of practice still continue, and probably always will continue to occupy part of the time of the convention, and some of these that are now coming up will probably eventually settle down to a standard or recommended practice as others have done in the past, while others that have been regarded as settled will recur again and again as new conditions arise demanding a reconsideration of an old subject. That of tire shrinkage allowance may be taken as a sample. The establishment of the $^1/_{80}$ in. to the foot of diameter corresponds closely to the $^1/_{1000}$ allowance used on European railroads, where the question now is not so much that of actual shrinkage allowance as of the proper support in the wheel center to sustain the stresses that are imposed by the cooling of the tire.

Other details, such as the proper spacing of tubes, the use of corrugated tubes, and the best methods of applying hub liners, are touched on so as to keep practice up to the requirements of modern heavy service. In and through all this there was the thoroughness and high standards that have characterized all of the past work of the association.

A DEFECTIVE ACCOUNTING SYSTEM.

Under date of May 10 the Division of Statistics and Accounts of the Interstate Commerce Commission issued a circular in which it acknowledged the report submitted by the Association of American Railway Accounting Officers dated April 26, 1907, relative to operating revenue accounts, operating expense accounts, outside operations, train, engine and car miles and construction and equipment expenditures. The Commission announced that it was not yet ready to promulgate a final order, but recognized the necessity of advising carriers of its intentions in regard to the primary operating accounts to be put in force July 1, 1907, and sought to define the objects and scope of these accounts. This circular is familiar to most of our readers, and it will not be necessary for us to quote it at length. The connection of the Accountants' Association with the work of the commission arose from the fact that the association was in convention when the rate-law was passed, and a committee was appointed to take up the matter of uniform accounts with the Interstate Commerce Commission. It seems that this committee of 25 men has met every three months during the last year, while a sub-committee of seven was appointed to compile and classify the mass of detail. The work of the sub-committee was approved by the entire committee and submitted to the association April 24 at Atlantic City. The association made certain changes, and recommended the result to the Interstate Commerce Commission for adoption.

The whole matter of the accountants' recommendations and the adoption of them by the Interstate Commerce Commission, apparently without much consideration, serves to illustrate how easy it is for railroad regulation to go astray and make mistakes unless the persons doing the regulating possess the broadest kind of an outlook of the entire situation. It is well known that railroad operating accounts have two primary uses, one being to prevent unauthorized expenditures and locate properly all sums received; the other, to afford a measure by which executive officers can watch and control their properties. The recommendations drawn up by the accountants and adopted by the Interstate Commerce Commission provide very nicely for the first of these two considerations, but leave much to be desired in their provision for the second; in fact, should the order be promulgated and carried through strictly on the lines now indicated, it would work a great deal of harm to a large group of railroads.

The objections to the order may be summarized under several heads. It has been pointed out by a railroad officer who regards the entire order as a very bad one, that the system is entirely without balance, and the accounts are badly arranged, mixing in expenditures for labor and for material indiscriminately. Nearly half the cost of maintaining permanent way is lumped into one account (roadway and track) with the result that in the places where supervision and control could best be exerted by executive officers, the expense is bulked so large as to obscure all the essential facts, while in accounts where control can be but slightly exerted, the divisions are so minute as to be burdensome. Inconsistencies can also to be pointed out. Thus the rent of tracks, yards and terminals is charged and credited to expenses, while the rent of cars is charged to expenses and credited to earnings. It is pertinently asked, upon what ground it can be ruled that when A rents a track to B it works a reduction in his expenses, but that when he rents a car it swells his earnings.

An effective objection to the new accounts is also found in the fact that the proposed system interrupts the continuity of railroad statistics at a time when statistical details are most needed to point the way to necessary economies and to test the efficiency of operating methods.

The requirement that a specific charge be made to provide for depreciation, reported monthly, is likely to make a great deal of trouble for roads in the newer and less developed parts of the country. In the circular of May 10 a direct charge for depreciation is made under the head "Maintenance of Equipment." The item of depreciation, as applied to way and structures, is not yet specifically set forth, and the Commission says that it has not arrived at any final conclusion in the matter, but it says very definitely that its list of operating expenses must not be burdened with expenditures for additions, the purposes of which are to improve the property operated. Charging betterments to operation has, as a matter of fact, taken the place of a specific depreciation charge in American practice, with the important distinction that it has been wholly flexible, permitting advantage to be taken of good years and allowing such work to be passed over in bad years, without stirring up hostile comment.

After a railroad running in a densely populated section of the country has put itself in first-class shape for handling continuously heavy traffic, a rule like this works no particular injustice, from which it follows that the northern and eastern roads are not, as a whole, opposed to it, but in the undeveloped parts of the country, as, for example the Southwest, the situation is entirely different. The roads in the Southwest and other parts of the country, where the growth of population and resources is a new thing which has by no means attained its maximum, have never found it possible to provide for their old age out of their youthful earnings. They have held, and held rightly enough as events have proved, that the country was growing up around them, and that their first need and duty was to serve and develop that country in the best way they could, and it has been well said that there has never been a railroad built through an undeveloped part of the Southwest that, from the beginning of its operations, could have included in current operating expenses, charges for depreciation and obsolescence without showing a deficit.

From the standpoint of their relations with the investing public it was right and natural that these roads should desire to count among their assets the growth in business which was continually coming to them, at least to the extent that the assets be not written off year by year. As the development of these younger parts of the country has progressed, the roads have, as a matter of fact, provided adequately for depreciation through the replacement of small and old equipment with new and heavy equipment, and through the rebuilding of those portions of their lines which were the weakest and least adapted for the needs of through traffic. A long list of roads, like the Atchison, could be cited which are now charging to the upkeep of track, structures and equipment, something like double their strict necessities.

It has been the usual tendency of American railroad practice, especially during the last decade, to leave the property each year, not only in as good condition as it was the year before, but materially better, from expenditure charged to earnings. The new arrangements proposed by the Interstate Commerce Commission do not tend to improve this existing practice, but only to create an arbitrary charge, which cannot be expected to accomplish any better results than are now achieved with the flexible charge.

A hopeful feature of the situation lies in the intimation that

the depreciation charge will not at first be obligatory against way and structures, but only against equipment. The process by which a good many roads now provide for the replacement of old equipment with new does not differ very materially from the plan laid down by the accountants, although in this case, too, it is the weaker who must bear the burden. The Northern Pacific, the Pennsylvania, the Baltimore & Ohio, the Norfolk & Western and a number of other strong companies now use a system of accounting depreciation of equipment similar to that prescribed by the Commission. But these roads adopted their present systems in line with an effort to conform to the previous classification adopted by the Interstate Commerce Commission, a classification in many ways defective. If a change is to be made, it is surely of first-class importance that it be made correctly, and that the new accounts for which the railroad companies are to be held rigidly responsible be adopted only after the fullest conference between the Interstate Commerce Commission, the accountants—who are responsible for the exact records of funds—and also the executive officers, who use the accounts as a measure of efficiency of management.

How rigidly the railroads will be restricted, may be judged from the undated order of the Interstate Commerce Commission issued several weeks ago to the effect that it will be unlawful for any steam rail carrier or for the receiver or operating trustee of any such carrier to keep any account or record or memorandum of any operating expense item "except in the manner and form in said third revised issue set forth and hereby prescribed and except as hereinafter authorized." In order that the basis of comparison between the fiscal year ending June 30, 1908, and previous years be not destroyed, carriers will be allowed, during that year, to keep whatever accounts they desire in addition to the required ones, and they may also keep temporary or experimental accounts "the purpose of which is to develop the efficiency of operations," provided that such temporary or experimental accounts shall not impair the integrity of any general or primary account prescribed, and that any such temporary or experimental accounts shall be open to inspection by the Commission.

But these privileges are apparently to cease after 1908. When it is realized that the committee of the accounting officers was not a unit in itself, and that its recommendations concealed many differences of opinion, while severe restrictions prevent railroad managers from developing statistical systems especially adapted to their own needs, it goes without saying that a hasty, half-baked accounting system, designed to meet only one of the two purposes of accounts and not vised by the officers most concerned, nor even carefully considered by the Interstate Commerce Commission, should not be given the force of a ruling. There is every reason why the postponement of a year, so earnestly sought by a large group of executive officers, should be allowed in the interests not only of common fairness, but of an eventual system of accounts which will do what it is intended to do.

CONTRIBUTIONS

The Profitable Weight and Speed of Freight Trains.

Baltimore, Md., May 27, 1907.

To the Editor of the Railroad Gazette:

With regard to Mr. W. A. Worthington's letter in your issue of May 17, I have not at any time sought to dispute the obvious conclusion from my figures that the ton-mile cost under quicker movement would rise. All that I have ventured on this point is a speculation that delays, damages, injuries and wear and tear are so extensive under present methods that a critical analysis of all a railroad company's expenses might show a lower ton-mile cost for the faster movement with the lighter load. I would repeat to Mr. Worthington the question I put to him in my letter of April 8 in your issue of April 12. "What does it matter what is the cost of completing and paying for a period of railroad transportation provided the net revenue at the end of the period is more and provided that all the implements of operation have been maintained in proper working order?" I would ask him to consider that question, keeping before him at the same time the third paragraph of Mr. C. F. Noyes's letter of February 23d in your issue of March 8, viz.: "Most operating officers base their loading and movement of trains on the showing a single train can make between any two terminals." Mr. Worthington still adheres to the hypothesis that had the railroads sufficient locomotives, cars and tracks it would be better to operate on present basis. The point I am trying to bring out is that the railroads are not getting the best possible service out of the locomotives, cars and tracks already in existence, and thus we circle round and round.

I do not quite see the point Mr. W. A. Worthington seeks to make in attaching any importance to the 2,000,000 loaded car miles I took for my original table; I might just as well have taken 20,000,000, or, in fact, the entire ton mileage of the railroads in the United States. I was seeking to illustrate a principle and possibly the best way to drive home on him the import of that principle would have been to take this total ton mileage of the United States and show how much more ton mileage could have been accomplished had the business been moved in lighter load at faster rates of speed.

In a discussion of the proper point at which to compromise between load and speed I see no force whatever in his comparison of the increase in ton mileage and in the tractive power of locomotives in 1905 over 1902. The argument being that the engines are too heavily loaded to get the greatest amount of net revenue out of them, Mr. Worthington's comparison, if it has any value in the argument at all, inclines rather to support the view that the increased tractive power of locomotives has led to a weight of load that has brought about the slow movement which I am endeavoring to show is less profitable in the long run than a faster movement with lighter loads.

Mr. W. A. Worthington seeks to invalidate my original statement by pointing out that as my speeds are inclusive speeds it is physically impossible to carry the relative loads shown in the table at the given speeds because it is necessary to secure higher exclusive speeds to secure the inclusive speeds. It would no doubt have been better had I constructed the table to emphasize this undoubtedly important distinction, but the fact that I did not do so by no means invalidates the figures because each line of the statement requires a similar adjustment. In order to substantiate this I submit the following comparison based on Mr. B. A. Worthington's 15 miles running speed and nine miles inclusive speed, and on the reductions he says I should make in the load in order to secure the stated running speeds on a four-tenths of 1 per cent. grade (see his letter of February 8 in your issue of the 15th idem).

	Per hour operation—		
	9 to 15 miles.	15 to 20 miles	15 to 20 miles
Value of car-mile	10 cents.	10 cents.	8 cents.
Miles per hour inclusive of delays	9	15	15
Miles per hour exclusive of delays	15	20	20
Cars per train-mile	40	33	33
No. of train-miles	50,000	60,606	60,606
Value of train-miles	$4.00	$3.30	$2.64
Gross revenue	$200,000	$200,000	$160,000
No. hours in which accumulated	5,555	4,040	4,040
Cost, per train-mile	75c.	69c.	55c.
Total cost	$37,500	$41,818	$33,333
Net revenue	$162,500	$158,182	$126,667
Train mileage in hrs. gained over slow movement.	.....	22,725	22,725
Revenue in hrs. gained	.....	$74,993	$59,994
Cost of additional train miles	.....	$15,680	$12,499
Net revenue from addit'l train-miles	.....	$59,313	$47,495
Total net revenue in 5,555 hrs.	$162,500	$217,495	$174,162
Increase in car mileage for the faster movement in 5,555 hrs.		749,925 or 37 per cent.	

It will be noted that for the faster operation the load is reduced 17 per cent. As stated this is based on Mr. B. A. Worthington's table showing that an increase in speed from 15 miles to 20 miles an hour requires a reduction of load to that extent, but in addition to this in the 8 cent per car-mile example it will be observed I have cut the load in the car 20 per cent., which will surely meet the requirements of Mr. Worthington's curves.

It will be said that an inclusive speed of 15 miles an hour with the lighter load cannot be secured on account of increased number of trains and consequently meeting places. My opponents laid great stress on this but I endeavored to show by the time-tables in my letter of the 4th inst. in your issue of the 10th idem that what is lost in the larger number of meetings is much more than made up in quicker movement along the road. In addition to this there can be no doubt that on crowded lines despatching delays to a train capable of moving at 20 miles an hour must be considerably less than to one moving at 15 miles an hour only, and consideration of this fact should make it evident that the table at the end of Mr. W. A. Worthington's letter in your issue of the 17th inst., in which he attributes as much delay to a quick moving train as to a slow moving one sets forth a highly improbable if not impossible condition of affairs.

I shall be challenged without doubt also on the reduction in cost from 75 cents to 55 cents per train-mile. The greater portion of this is made up of reduced cost for car repairs. Forty cars at 8 mills per car-mile is 32 cents per train-mile, but 33 cars at 5 mills (see mine of April 8th in your issue of the 12th idem) is 16.5 cents per train-mile. Thus car repairs alone reduce the cost to 58.5 cents per train-mile, leaving 3.5 cents to represent the reduction in locomotive cost and in overtime, so that I do not think it can be said I am unduly straining the figures in reducing the expense 20 cents per train-mile.

Mr. W. A. Worthington is evidently of the opinion that there is less safety to operation in increasing the number of trains to handle a given traffic. I doubt if he is justified in this opinion considering the numerous accidents that happen to the long, heavy trains of to-day and the way in which slow-moving freight trains are forced on to the time of passenger trains, both on single and

double track roads. No railroad man can travel even a few miles on the main lines of the country without experiencing those numerous stops which to the uninitiated are so unaccountable.

Should it be my good fortune to have set forth in this letter figures which my critics are more ready to accept I do not know that I can say anything more on the subject. My single aim in opening the discussion was to elicit expression of opinion as to whether our present ideas and practices relative to units of weight are resulting satisfactorily. In view of the very heavy increases in mortality and injuries both to passengers and employees (much of which according to the Interstate Commerce Commission is not reported and so escapes the official returns), in view of the difficulty of securing an adequate supply of men of the right sort to operate the trains, in view of the dilemma in relation to the rail, in view of the apparently insurmountable difficulty of making 100,000-lb. cars pivot with due safety on their trucks, and in view of sundry other important conditions which it is not necessary to detail here, it would appear that this discussion is of very great importance and demands the most serious consideration of all thinking minds in the engineering world. It may take some courage to admit that anxiety to "produce results" has led to the invasion of proper factors of safety, but if engineers are of the opinion that this has been done it seems to me that it is their imperative duty to insist on some retracement of the path that has been followed, even if indeed this should involve an order to reduce the loading 10 per cent. to 20 per cent. My own contribution to the discussion as far as it has gone is nothing more than an endeavor to show that such an order need not necessarily prove disastrous to profits.

M. B. WILD.

Foreign Railroad Notes.

The Swedish efforts to remedy the lack of fuel by substituting electricity are said to be likely to be realized, estimates having been made that five waterfalls will yield motive power enough to work all the State Railroads in southern Sweden, at a cost of $16,000,000 for installation.

The International Sleeping Car Co., the European Pullman, earned gross in 1906 $4,062,778, and net $1,536,200 from its sleeping car service. It has besides sleeping cars a large number of fine winter resort hotels, which in the aggregate yield no profit. A dividend of 16¼ per cent. was paid, and this absorbed a little less than one-half of the net earnings.

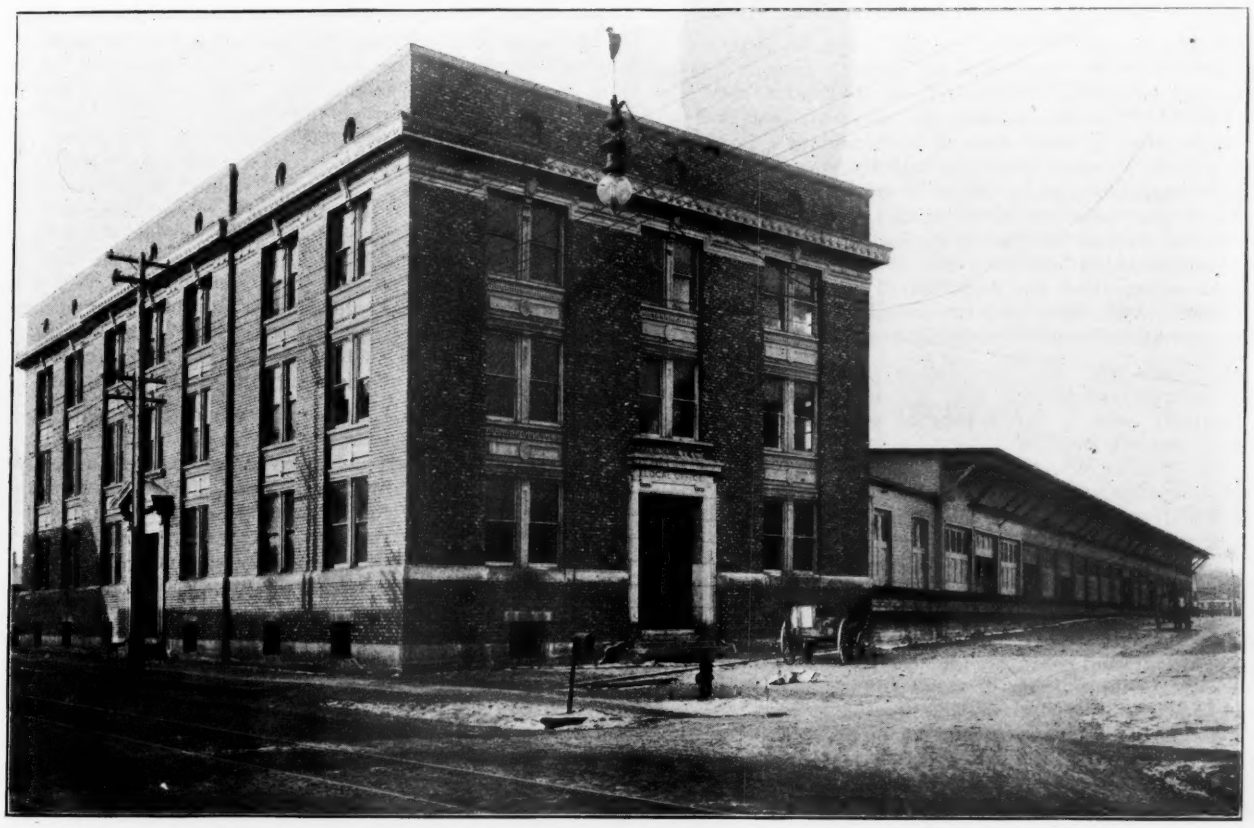
The Swiss State Railroads contemplate establishing at Renen car works for building new cars. The existing car works in Switzerland are said to have more than they can do to supply the private and street railroads. No State Railroads heretofore have attempted to build their own rolling stock.

The Austrian State Railroads have provided that on excursions of the children of the public schools the pupils will be charged only half fare, and two children under 10 may travel on one-half fare ticket; further, that for every 10 paying pupils one child who can't pay will be taken along free.

The traffic through the Simplon Tunnel during the first six months since its opening is reported to have been 230,000 passengers, and only 24,930 tons of freight, an average of 69 tons each way daily. It was hardly worth the while to excavate a tunnel 12½ miles long for such a traffic; but it is expected to do better hereafter.

New Office and Freight Building at Toledo for the Toledo, St. Louis & Western.

The Toledo, St. Louis & Western (Clover Leaf) has built at Toledo, Ohio, a new office building and freight house with the necessary track facilities to handle the business at that important terminal. The office building is at the corner of Erie and Krauss streets, the main entrance being on the former. It is a stone and brick building with three stories and a basement, the latter and all foundations being concrete. The interior of the building is finished in marble and hard wood. The first floor contains the local freight office, with quarters for the freight agent, cashier and general agent, telegraph and telephone exchanges, also a large room for stationery supplies. The entrance to the freight office is on Krauss street. The second floor has the offices of the president and general manager; second vice-president and general traffic manager; purchasing agent; general freight and passenger agent; assistant general freight agent, and their forces. The general auditor's and the freight claim departments occupy the third floor. On each floor, including the basement, is a fireproof vault 18 ft. x 22 ft. The basement contains the heating apparatus and extra storage rooms.



General Office Building and Freight House at Toledo, Ohio; Toledo, St. Louis & Western.

The freight house is immediately back of and adjoins the office building. It is 352 ft. long and 52 ft. wide. It is of wood construction and is enclosed with large automatic lifting doors. There is an open platform at the end of the building for handling oils and such commodities, and at one corner of same is a 20-ton pillar crane for moving heavy stuff. There are ten tracks, four of which are house tracks and the remainder team tracks holding between 90 and 100 cars.

The new facilities replace a freight house 22 ft. x 200 ft., which had been outgrown.

Address of Secretary Moseley to the M. C. B. Convention.

Since your last convention the question of car shortage has attracted a large share of public attention. If the enforcement of your rules unnecessarily delays the movement of cars, the rules should be altered. On the other hand, if detention is caused by the non-observance of rules which, if lived up to, would clearly facilitate the movement of cars, then some method should be devised to bring about enforcement of those rules at the April meeting of the Western Railway Club. W. E. Beecham, of the C., M. & St. P., cited cases where three roads paid $72.50 for the privilege of juggling two empty foreign cars between them, equivalent to throwing so much money away, while the cars were held out of service for two months. Mr. Beecham spoke particularly of Chicago, but the condition he points out prevails at all large terminals, and it is mighty expensive for the railroads. And the important point is that the condition is due to failure to observe the M. C. B. rules. As Mr. Beecham well says: "It is apparent that we don't need any more rules or agreements to meet the situation, and that failure to observe the rules and agreements now in effect is the cause of the trouble."

I have called attention to this matter because the charge has been made that because of its unnecessary severity in enforcing the Safety Appliance Law the Interstate Commerce Commission is largely responsible for the car shortage, and I want to refute that charge. I have never yet heard of a car being held up and juggled back and forth between two roads on account of safety appliance defects for which neither road cared to assume responsibility. It is true that cars are frequently sent back for penalty defects, but in all such cases the defects are promptly repaired and the cars again sent forward. I do not believe an inspector would take chances on treating penalty defect cars in that manner. He would fear that if he did so his road might be called upon to pay penalties in addition to per diem and he would be asked by his superiors for an explanation that might be hard for him to make. If all M. C. B. defects were covered by the Safety Appliance Law there would be much less complaint about delay to cars at terminals than there is now. With knowledge that the handling of cars with those defects laid the roads liable to a penalty would come an adequate system for promptly and efficiently repairing them.

Neither is it true that the Commission has exercised undue severity in its enforcement of this law. Copies of our inspection reports are regularly sent to the managing officers of all roads, so that they may observe whether improvement or the reverse has taken place. We have never yet entered suit without giving fair warning and ample opportunity to correct any unfavorable condition that was shown to exist. It is not the purpose of the Commission to enter on a crusade for the collection of penalties, and its inspectors are instructed to use the utmost care and circumspection in filing reports of violations. They have been impressed with the idea that the carrying out of the statute is what we are seeking to obtain, and not the imposition of penalties. The Commission has always discouraged the idea that the measure of an inspector's efficiency is the number of violations he may file against carriers, and it is a matter of supreme satisfaction both to the Commission and its inspectors when the ends of the statute can be obtained without prosecutions. I think I may safely say that the members of this Association have had sufficient experience in dealing with the Commission to know that carriers who are honestly and conscientiously endeavoring to comply with the law have no reason to complain that the Commission is unduly severe in its enforcement.

But there will be no slackening of effort. The uniform success that has attended prosecutions demonstrates the care which our inspectors have taken to secure correct information. In a case decided less than a fortnight past a judge from the bench paid a high compliment to two of our inspectors for their intelligence, and the lucid testimony they furnished on the witness stand. Out of prosecutions for 927 violations of the statute to date, adverse decisions (involving four penalties) have been rendered in but one court. These cases are now pending on appeal to the Circuit Court of Appeals for the Eighth Circuit. Four hundred and twenty-eight cases are now on the trial dockets, and penalties have been paid for 350 violations.

Of the various defects constituting the basis of prosecution, inoperative uncoupling mechanism constitute a large majority. There are 672 cases of this character. In 22 cases the chain had become kinked and wedged in the body of the coupler, thus rendering it impossible to lift the lock block. In 92 cases the lock block was either broken or missing. In five cases the chain connecting the lock block to the lever was too long, rendering it impossible to lift the lock block. In 76 cases the lever was missing. In 23 cases the lever was broken. In 433 cases the uncoupling chain was disconnected from the lock block, caused by broken links in chain, broken or missing clevis or missing clevis pins. There were 15 cases of link and pin coupler; 21 of inoperative driving wheel brakes on locomotives; 66 cases of failure to have the required percentage of air-brakes; two broken couplers; 102 missing or insecure grab irons; 21 cases of drawbars either greater or less than the standard height, and 27 cases of cars (without couplers) fastened together with chains.

In many instances carriers have paid out hundreds of dollars in penalties which could have been entirely avoided by the expenditure of a few cents in labor and materials for repairs. One road paid $1,400 for defects that could have been repaired at a cost of $6.45; another paid $1,300 for defects that could have been repaired for $2.45; another paid $600 for defects that 80 cents would have fixed; another paid $300 which could have been avoided by the expenditure of 15 cents. A total of 282 violations, involving fines amounting to $28,200, could have been avoided by the expenditure of $68.03, or an average cost per violation of 24 cents. These estimates have been made with considerable care from the scale of prices furnished by this association. Beyond any question it is cheaper to repair safety appliances than to pay penalties.

There is still considerable unnecessary handling of chained up cars. The Commission has no power to modify the terms of the statute in any particular. Carriers must in all cases judge for themselves whether or not a particular act is in violation of the law. There is now such a large body of court decisions to refer to that little difficulty should be experienced in arriving at a correct understanding of a carrier's rights under the law in most cases that may chance to arise. The movement of chained up cars has been declared unlawful by Judges McPherson, Wolverton, Trieber and McCall. The substance of the holding of these four judges is that the carriers of the country cannot localize all repairs at one shop of their entire system, but that they must have men and material which can make all these safety appliance repairs wherever there is any likelihood of defects occurring. As Judge Purnell said in his decision in the Atlantic Coast Line case, "The United States is entitled to recover the statutory penalty for violation of the Federal Safety Appliance Act under all circumstances where an injured employee has under that statute the benefit of denial of 'assumption of risk.'" From this it would appear that the government has a right to recover penalties for any and all movements whatsoever of defective equipment. As the employee does not assume the risk attending the movement of equipment not complying with the requirements of the law even to a repair point, such risk must be borne by the carrier and not by the employee.

Complaints continue numerous respecting the bad condition of hand-brakes. With the rapid increase in the use of air the hand-brake has been neglected. Many employees have suffered serious injuries in gravity yards because of defective hand-brakes, and to this cause may be attributed much of the damage to cars and their contents which is commonly laid to rough usage or carelessness in switching. Our inspectors still find many hand-brakes working opposite to the air-brakes. This is extremely dangerous and it has been so repeatedly condemned that it is somewhat surprising to find such a condition existing in any degree at this time.

There is still much to be accomplished in the direction of securing uniform compliance with the association's standards. Recognizing the need of uniformity, the Commission has endorsed your standards and endeavored to uphold them in every possible way. Its attitude has practically given your standards for the protection of trainmen the force of law. In view of this condition it seems as though it should be a matter of pride with every member to adhere strictly to standards which have been agreed to after the most careful consideration. But we find many cases where individuals have adopted their own ideas in opposition to standards, although employed by members of this association who have signified their approval of those standards. This lack of uniformity is particularly noticeable with respect to the application of grab irons. In many cases the practice seems to be to stick them on any old way, just so they are got onto the car, and it is not unusual to find grab irons applied differently on opposite ends of the same car. Uniformity in these matters is greatly to be desired. It is of more importance than the comparative merit of different devices or methods of application. Conceding that a particular method advocated by an individual may be, considered by itself, superior to the standard in point of both safety and convenience, still it cannot be approved if it destroys uniformity. What trainmen want is uniform application. They want to know, when they attempt to use a grab iron, a sill step, ladder or uncoupling lever on any car, that they will find the device in the same location, and applied in the same manner as they would expect to find it on every other car of the same class. This is especially important for the protection of men in switching cars at night, particularly in gravity yards and terminals where large numbers of cars have to be handled with the greatest possible despatch.

There is need of a standard uncoupling arrangement for passenger cars. The old style of platform arrangement has been found inadequate, because it involves the practice of disconnecting the

uncoupling chains in many cases where sharp curves exist, to prevent trains from parting while in motion; also, to obviate the danger of trains parting by the action of passengers or other unauthorized persons meddling with the levers. To comply with the law it has been deemed necessary to adopt some device that can be operated by a man standing on the ground at the side of the car and which will obviate the necessity of disconnecting chains, and in meeting this need devices of various constructions and applications are used. In the interest of uniformity and safety, a standard should be adopted.

While interchange rule No. 36 in conjunction with the Safety Appliance Law has brought about a considerable increase in the number of air-brakes in use during the past year, it is noted that there has been some decrease in the efficiency with which air-brake equipment is maintained. The cleaning and oiling of triples is frequently done in a perfunctory manner. In several instances it has been complained to our inspectors, though no positive evidence has been obtained by us that the complaint is well founded, that in certain test yards it is the practice to re-stencil triples that pass the test without cleaning. Too little attention is paid to the adjustment of piston travel. The renewal of leaky packing leathers also needs greater attention.

In some portions of the western territory our inspectors have observed that in repairing safety appliance defects preference is given to penalty and per diem cars—that is, cars of other roads. This frequently results in the neglect of other equipment and such other equipment is handled about yards, delivered to industries and interchange tracks, and sometimes permitted to go forward in trains with safety appliances in defective condition. The remedy for this appears to be increase in the repair force.

The tendency of federal legislation is to increase the financial responsibility of carriers for personal injury to their employees. This was attempted in the Safety Appliance Law. The government in effect said to the railroads: "Here are certain standards of equipment which you must maintain. Failure to observe any one of these requirements will subject you to a penalty of $100, and in addition thereto, if an employee is injured or killed through the use of equipment in violation of law, you cannot avail yourselves of the common law defense of assumed risk to avoid financial responsibility therefor."

The enforcement of the $100 penalty has brought about a wonderful improvement in railroad equipment and greatly increased the safety of employees. Experience with regard to the indirect penalty of increased liability for damages has not been so entirely satisfactory. Previous to the enactment of the Safety Appliance Law, the defense of assumed risk was very effective and was much employed in personal injury cases. Deprived of this defense, the railroads fell back upon another equally effective, namely, contributory negligence. While in legal theory assumed risk and contributory negligence are separate and distinct doctrines, it is nevertheless true that there is sufficient analogy between them to make it sometimes difficult to distinguish one from the other.

The difficulty in securing adequate enforcement of Section 8 of the Safety Appliance Law undoubtedly hastened the enactment of the Employers' Liability Law of June 11, 1906, Section 2 of which defines the rights of employees when charged with contributory negligence in personal injury cases and limits the extent to which this defense can be used by employers. The necessity for a law of this character has long been felt. All progressive countries have recognized the need for a modification of the archaic and inhuman common law rules governing the relations of master and servant and have enacted far more drastic legislation than has ever been attempted in this country to govern those relations. It is true that many of the states have enacted employers' liability laws, but they have lacked uniformity, and by reason of their essential limitations they are not applicable to interstate employments. As a consequence, the great body of railroad employees have been subjected to the injustice and inhumanity of common law rules. The constitutionality of this law has been vigorously attacked by the railroads. * * *

Were it not for the earnest co-operation which the Commission has received from members of your association in its efforts to secure the ends of the Safety Appliance Law, the extremely favorable conditions now prevailing would not exist. Our inspectors have always been treated with the greatest consideration by the master car builders; we have never yet received a complaint that the attitude of any member of your association was anything less than cordial and helpful. Were the matter of maintenance of equipment so as to preserve the conditions contemplated by the law left entirely in the hands of the master car builders, I feel confident in asserting that prosecutions for violation of the statute would be extremely rare.

Through its action in increasing the appropriations, the government has signified a determination to continue its policy of vigorous enforcement of the law, and it is but fair to say that it is the Commission's intention, if possible, to demonstrate to the railroads that it is a measure not only of economy but of humanity to keep equipment in such a condition of repair that prosecutions in court will be no longer necessary; in other words, that it will be cheaper to repair equipment than to pay penalties for violation of the law. * * *

Master Car Builders' Reports.

The committee reports of the Master Car Builders' Association are quite up to the standard of previous years. We have given considerable space to the report on Tests of M. C. B. Couplers, and have made an abstract of such of the others as are important for record.

REVISION OF STANDARDS AND RECOMMENDED PRACTICE.

The following is a list of the important recommendations of the committee:

Standards.

Standard 5 by 9 Journal Box.—That the inside dust guard be restored at the top, and that it be joined to the inside side wall with a 3-in. radius, with the center located 1 in. above the horizontal center line of the box, and (b) that the opening in the outside wall be enlarged at the side and struck with a 4-in. radius all around. The dimension 5⅛ in. increased to $5^{3}/_{16}$ in. from the center of the box to the inside of the lug for the journal-bearing key, located in the top wall of the box, and that the width of the inside side lugs for the journal bearings be narrowed up from 2¾ in. to 2⅝ in. Fig. 1 shows the lines which are modified by the above suggestions, the dotted lines showing present openings in the back of the box and full lines the approved suggestions.

Standard 5½ by 10 Journal Box.—Similar changes should be made in the 5½ by 10-in. box, Sheet 17, the dimensions being as follows: Inside dust guard wall to be restored at the top, joined to the inside side wall with a 3-in. radius, center located 1½ in. above center line. Opening in outside back wall to be two 4-in. radii, the lower one-half to have its center line on center line of box, the center of the upper one-half to be ⅛ in. above center line of box.

The dimension 5⅝ in. from center of box to wedge face to be changed to $5^{11}/_{16}$ in. Width of inside lugs be changed from 3¾ in. to 2⅝ in. Fig. 2 shows the lines which are modified by the above suggestions, the dotted lines showing present openings in the back of the box and full lines the approved changes.

Axles.—The committee recommends that Sheet 7 be revised as follows: Axles A, B and C, that the radius between the wheel seat and the rough collar on the inside of the hub of the wheel be changed from ⅛ in. to ¾ in., as shown on axle D, with the center from which the radius is struck coincident with the inside face of the hub of the wheel, instead of being located inside of the face of the hub, as is the case on axle D. The axle D also to be changed in this regard, and also that the radii between the dust guard and the wheel seat of axles A, B and C be changed from ⅛ in. to ¼ in., as in axle D.

Brake Head and Shoe.—The brake head shown on Sheet 8 is a cast-iron pattern as adapted for wooden brake-beams. Owing to the large number of metal brake-beams in use, it is apparent that the only dimensions which should be considered are those governing the face and lugs for the attachment of the shoe. The committee submits and recommends a new drawing showing only the essential standard dimensions of the brake head, these same lines to be used in the combined drawing of the brake head and shoe. Also the shoe drawing revised to that (in part) shown in the report of the committee on brake-beams of 1906. We recommend the abolition of the sectional views A-B and C-D and the substitution therefor of the section X-X and the cut showing relation of ends of head and shoe. The section X-X differs from the present M. C. B. standard in rounding the outer edges of the shoe with a ⅝-in. radius on each side and making the face straight instead of tapered to one side. If thus made, shoes are not required to be right and left; cannot be wrongly applied; will take full bearing after a very few miles' run, and in a measure prevent overheating of the throat of the flange. Mr. Muhlfeld, G. S. M. P., of the Baltimore & Ohio, also suggests as follows:

> "With reference to the question of brake-beams, we would recommend that the bearing in the head of the brake-hanger be made with a curved surface, with a radius approximately equal to the length of the brake-hanger. This is to provide for the endwise motion of the brake-beam which, in the present form of brake-hanger bearing, with the flat surface, produces a pinching and bending of the hanger, and results in the failure of the hangers and the beams dropping on the tracks. By this change in the brake-head and the use of a brake-hanger with a curved bearing for the brake-head it will provide a rocking motion to the hangers and beams, and relieve the bending action of the hangers."

The committee also recommends the adoption of the brake head gage there shown. The recommended new Sheet 8 is shown in Fig. 3.

Brake-Beams.—The report of the special committee on brake-

beams to the 1906 convention recommends for adoption to brake-beams which are already standards and no statement of this is made, probably for the reason that they further recommend that beam No. 1 of the 7,500-lb. capacity with $^1/_{16}$-in. deflection shall not be put on cars weighing over 30,000 lbs. Braking at 30 per cent. of the light weight would impose a braking load of 5,250 lbs. on each of the four brake-beams. Too low a limit of weight has been imposed and it would be safe to place the No. 1 beam under cars weighing not over 35,000 lbs., which would impose a load of 6,125 lbs. per beam when braking at 70 per cent.

Specifications for Brake-Beams.—Changing distance to center of brake heads from 60½ to 60¼ in. is approved. Distance gage for brake heads is also approved. That all brake heads shall conform to M. C. B. standards and shall be proven by gage, is approved, provided the recommendations made in reference to brake heads and shoes, revised sheet 8, are accepted. Center to center of safety hangers to be 51 in. is approved. Angle of the lever fulcrum is already a standard of the Association and should be so stated.

The lever pin-hole 3 in. in front of the top of the brake head lugs is a dimension which is excessive, and will result in the weight of the lever overbalancing many types of beams and causing tops of brake-shoes to drag on the wheels. A very considerable number are in favor of a reduced distance, the various amounts recommended being 1½, 1¾, 2, 2¼, 2½ and 2¾ in. In view of the range of practice it is not feasible to obtain a single standard and therefore, as a step in that direction, the committee proposes two standards, namely, 2 in. and 3 in. from lever pin-hole to top of brake head lugs.

Lever pin-holes to be not less than $1^3/_{32}$ in., not more than $1^5/_{32}$-in. diameter is not approved. The standards for air-brakes on freight cars show pins $1^3/_{32}$-in. diameter and all holes for such pins 1⅛ in., and same dimensions should rule with brake-beam fulcrum holes. The committee recommends an addition to this item of the specification, to read as follows: "Holes to be made straight and true by drilling, reaming or broaching." The pin-hole gage is recommended for adoption.

The maximum of 9½ in. from the lever pin-hole to extreme back of beam is objected to by some manufacturers, and the committee can see no good reason in the restriction, and this recommendation is not approved. Test paragraphs are approved.

Recommended Practice for Brake-Beams.—That all beams be inside hung is approved, provided it will be construed as not recommending present outside hung brakes to be changed except where it can be conveniently and economically accomplished. That all beams be hung 13 in. from the rail is not approved, as the present standard for outside hung beams is 14½ in. from the rail. That brake hangers shall be attached to the brake head at the center and just back of the central brake-shoe lug is not approved. Such a hanging contributes to the unbalancing of beams so that they will drag shoes on the wheels unless held by a third suspension hanger; with "solid" beams such hanging makes a weak brake head construction or else makes an excessive depth of beam over all measured from the pin-hole; there is no special advantage apparent in the longer hanger required. A generally better hanging of freight brake-beams will be obtained with the hanger opening 3 in. above the center, and the committee recommends this as the principal location; at the center and alternate location to be used as may be desired. That brake-beam hangers shall be ⅞-in. diameter, is ap-

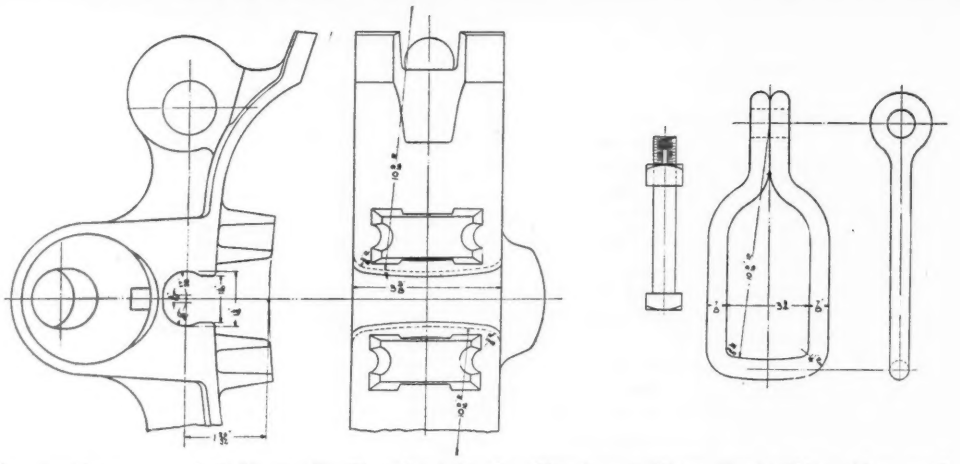


Fig. 3—Recommended M. C. B. Standard Brake Head and Shoe, Brake-Shoe Key and Brake-Head Gage.

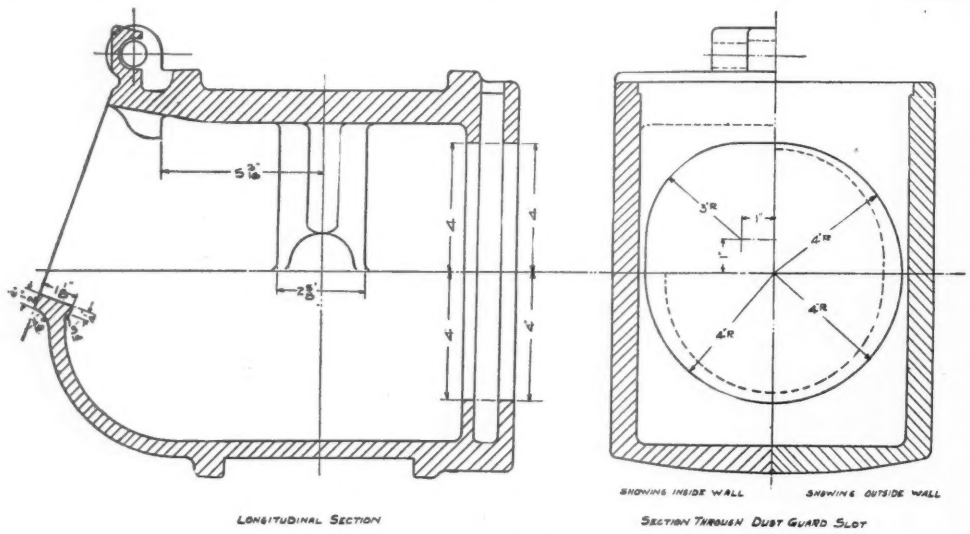


Fig. 1—Recommended M. C. B. Standard 5x9 Journal Box.

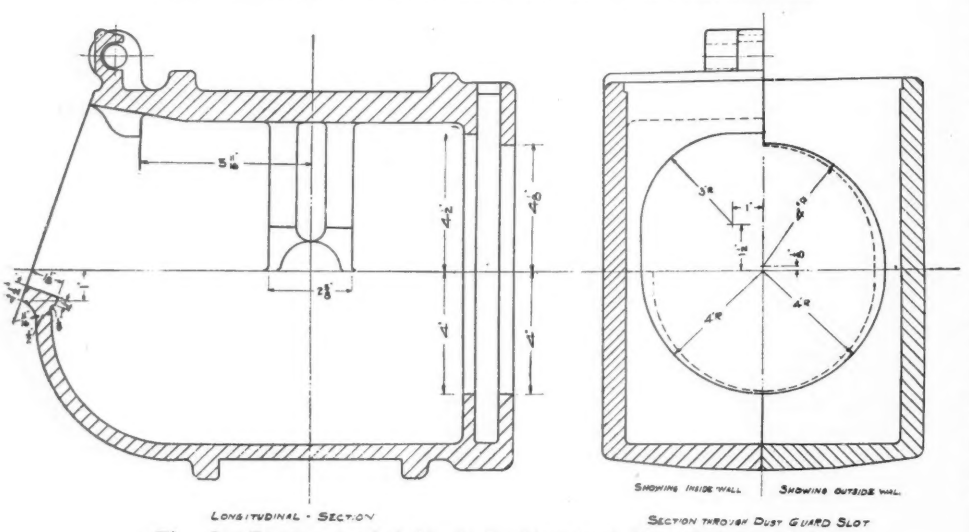


Fig. 2—Recommended M. C. B. Standard 5½x10 Journal Box.

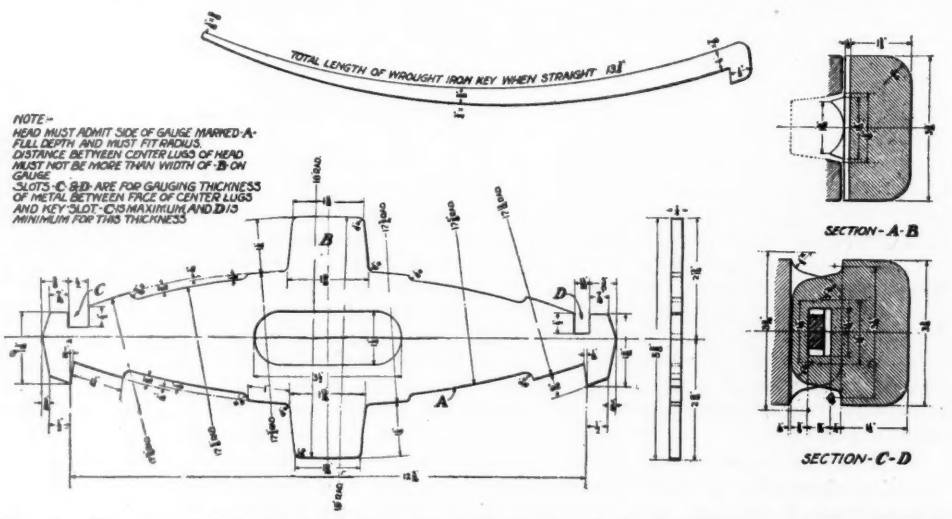


Fig. 4—Recommended M. C. B. Standard Brake-Head Gage; Sections A-B and C-D to be Abolished

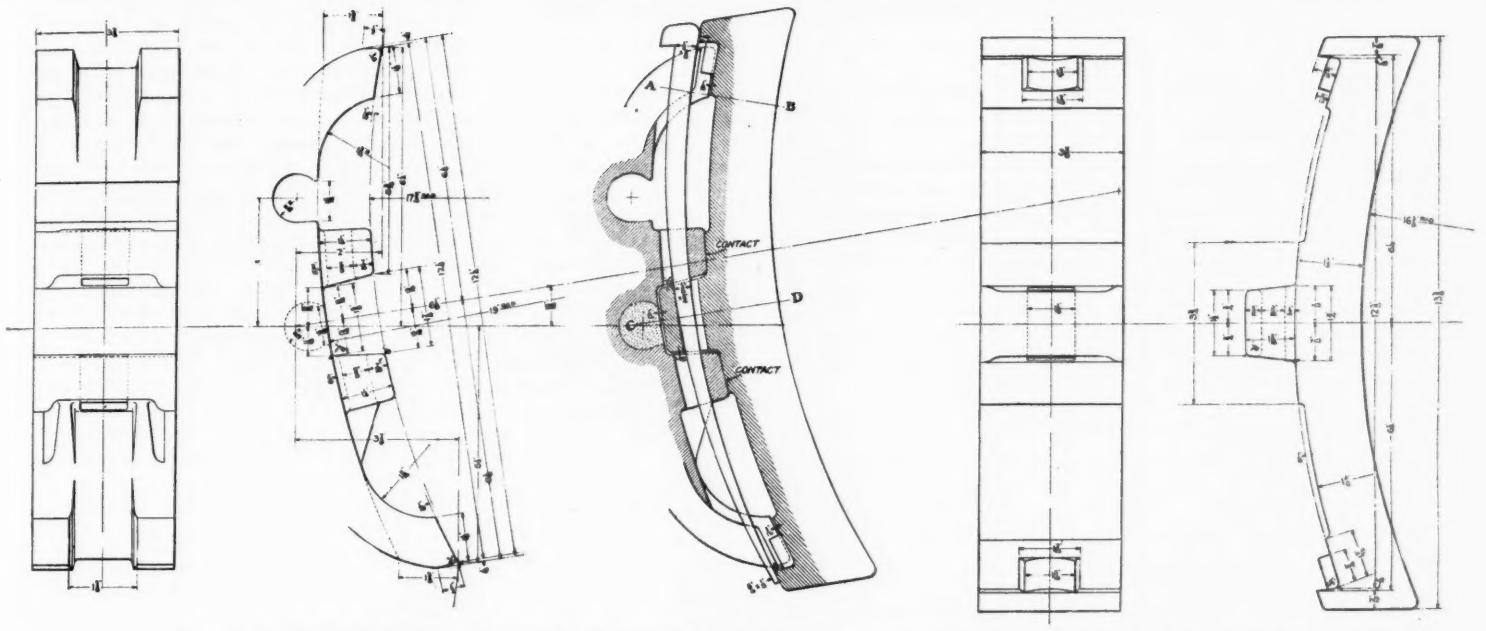
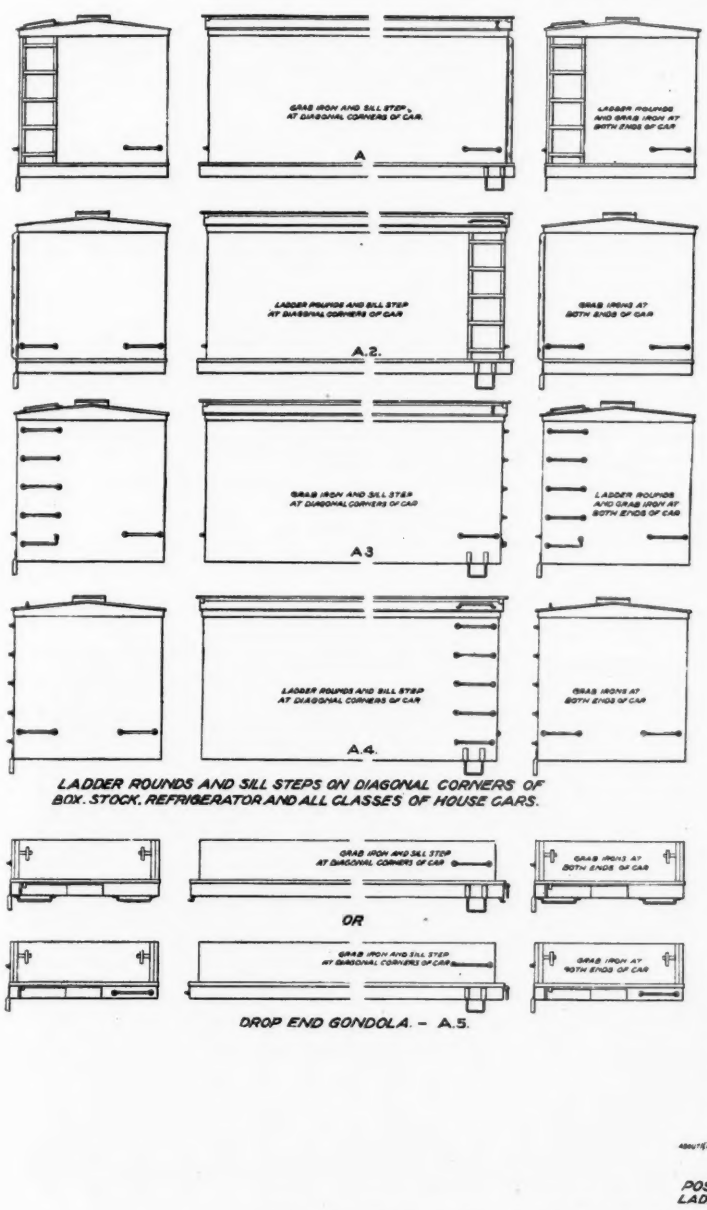
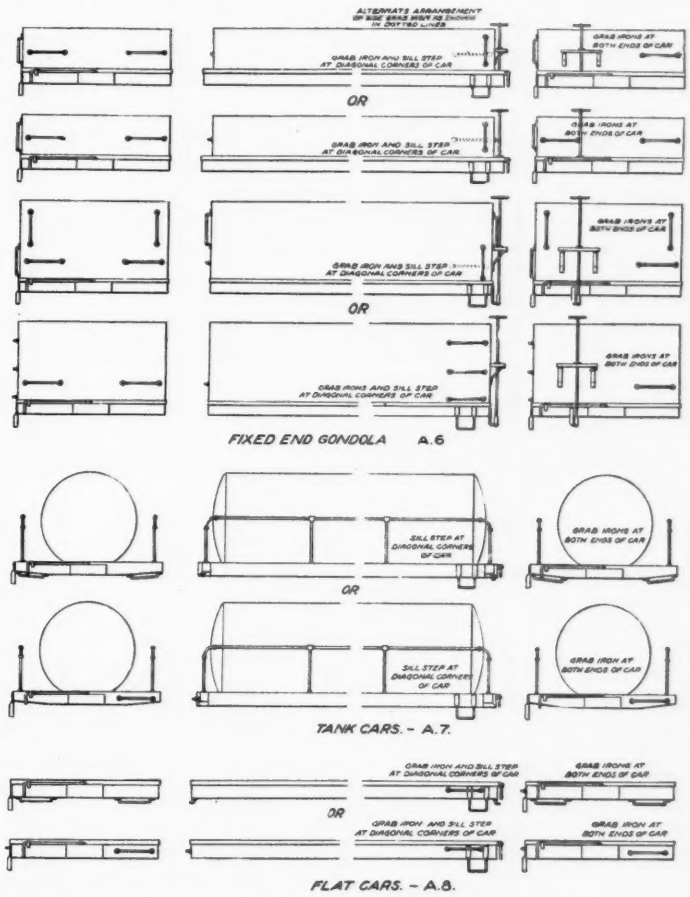


Fig. 5—Standard M. C. B. Contours of Brake Head, Shoe and Key and Their Relation to Each Other.





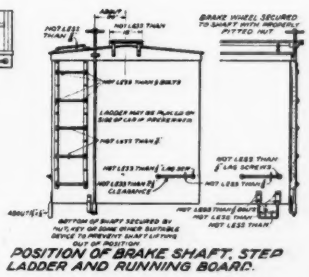


Fig. 6—M. C. B. Standards for Protection of Trainmen; Revised Drawing of Sheet 19.

proved. That the angle of brake-beam hangers with respect to a line drawn from the center of the brake-shoe to the center of the axle shall be as nearly as possible 90 deg. is approved. The use of third suspension hangers on all brake-beams is not believed to be necessary or advisable on freight equipment to secure a well-hung brake, *i.e.*, that approaches the wheel properly on application and then drops away from it freely on release with either a full or worn shoe. Probably third hangers are advisable with beams hung from the center and unbalanced by any other means. It is quite possible that the hanging can be so arranged as to sufficiently balance the beam and do away with the third hanger, which is not so frequently seen on freight equipment as to lead to the belief that it should be seriously entertained. The committee does not, therefore, approve this recommendation.

For safety hangers the recommendation that chains should be used is not approved. Two-link safety chains wear fast enough

without increasing the number of wearing points. The most successful safety device for brake-beams is a solid loop or stirrup passing around and under the beam attached to the bolster or truck side. Brake-beam safety chains are not mentioned in the present standards or recommended practice, and the committee doubts the wisdom of their introduction.

The recommendation that in order that these specifications may be generally observed, after September 1, 1910, all cars not equipped with brake-beams built in accordance with these specifications be subject to rejection in interchange on account of improper equipment, should be framed as a rule and proposed for adoption among the Rules of Interchange.

Air-Brakes, General Arrangement and Details.—The committee recommends that ⅜-in. straight link hand-brake chain be made a standard, and further recommends that the chain be attached to brake masts with a machine bolt instead of an eye bolt.

Siding, Flooring, Roofing and Lining.—Criticism has been made that the V in the section of siding does not show exactly central. It was the intention of the committee that proposed these sections in 1901 to have the V central and they will be so shown in the future.

Protection of Trainmen.—The text of the proposed changes is not reproduced here but Fig. 6 is a revised drawing of Sheet 19. —Editor.

Recommended Practice.

Safety Chains for Freight Cars.—The committee suggests that the buffer blocks shown on the drawing be eliminated, they being obsolete.

Box Car Side Door and End Door Fixtures.—This sheet should be referred to a special committee to cull out what is obsolete and to recommend modern and up-to-date door arrangements and fixtures. The present sheet is now 10 years old.

Pedestal and Journal Box for Passenger Cars for Journals 5 x 9 in.—This box and pedestal could be improved by being made 9 in. in width, and it should be referred to a special committee to make recommendations and propose designs.

The report is signed by T. S. Lloyd (Chairman), J. E. Buker and T. M. Ramsdell.

BRAKE-SHOE TESTS.

Last year attention was called to the fact that up to that time the committee on brake-shoes had been confined to a study of frictional qualities, and the importance of some work being undertaken which might lead to information concerning wearing qualities was urged. The practicability of such tests was shown, and a design for a proposed addition to the testing machine which would make them possible was presented as an appendix to the committee's report. As an initial step in the work for the year now ending it was determined that the work of the year should concern itself exclusively with a study of the wearing qualities of brake-shoes.

From a study of the problem the committee reached the conclusion that tests to determine the durability of the shoe might readily be made in the laboratory, provided some additional mechanism could be attached to the brake-shoe testing machine. The purpose of the proposed addition would be to permit the shoe to be brought in contact with the wheel of the testing machine for a predetermined interval, after which it would be automatically released, remaining in release position for another and a much longer interval, during which time both wheel and shoe would return to their normal temperature. It was believed that by such a cycle any shoe could be given a definite amount of exposure to wear, that a comparatively short interval during the application and a much longer one during the release would avoid all chances of excessive heating, and that by its automatic action the motion of the machine could continue hour after hour, with but little attention from the laboratory attendants. Accessory to the large machine there would of course be required a registering counter to show the number of applications, and a delicate balance for weighing the shoes before and after they are exposed to the action of the machine.

A mechanism which, when applied to the existing testing machine, would give the function above described, was designed by Prof. W. P. Turner, of Purdue University, employing compressed air for bringing about the required movements, the supply and discharge being governed by a light and comparatively inexpensive valve driven by gear connections with the testing-machine shaft. Under the control of the apparatus the brake-shoe testing machine may be run steadily at any given speed, the shoe being automatically applied and released. The apparatus was placed in service early in April and has since been employed in tests the results of which appear in another paragraph. Two sets of connecting gears are at present supplied. By the use of one, hereafter referred to as Gear A, the shoe is in contact with the wheel approximately one-tenth the total time and by use of the other, hereafter referred to as Gear B, one-quarter of the total time. The exact action is as follows:

Cycle Controlled by Gear A.

Revolutions during which shoe is in contact with wheel.... 160
Revolutions during which shoe is out of contact with wheel.1,440

Under the control of this gear 1,600 revolutions, or approximately the equivalent of 2.6 miles running, were required for each complete cycle. After some preliminary running it was decided that progress under this cycle was unnecessarily slow.

Cycle Controlled by Gear B.

Revolutions during which shoe is in contact with wheel.... 190
Revolutions during which shoe is out of contact with wheel. 610

Under the control of this gear 800 revolutions, or approximately the equivalent of 1.3 miles running, were required for each complete cycle. It was found that by employing a speed equivalent to 20 miles an hour and a brake-shoe pressure during application of 2,808 lbs., the machine could be kept in continuous motion under the cycle without undue heating either of the wheel or shoe. The severity of test conditions may be judged by the fact that the work done by the brake-shoe during each application is approximately the same as that which would be done by each of the eight shoes of a loaded 100,000-lb. capacity car in bringing the car to rest on a level track from a speed of 40 miles an hour. Shoes giving a high coefficient of friction, however, are under test conditions exposed to action which is somewhat more severe than that which would be required to stop the car. Under these conditions the wheel never became more than sensibly warm to the touch, and the shoe never excessively hot.

Shoes subjected to wearing test.—In selecting shoes for test, it

SPEED CONSTANT AT 20 MILES PER HOUR. PRESSURE OF SHOE ON WHEEL 2808 POUNDS REVOLUTIONS OF WHEEL DURING APPLICATION 190. EQUIVALENT DISTANCE RUN DURING APPLICATION 1641.5 FEET.

NUMBER OF SHOE.	RAILWAY CO SUBMITTING SHOE	MARKINGS ON SHOE	COEFFICIENT OF FRICTION	WEIGHT OF SHOE, POUNDS.	NUMBER OF APPLICATIONS	TOTAL LOSS OF WEIGHT POUNDS	LOSS OF WEIGHT PER APPLICATION POUNDS	1,000,000. FOOT-POUNDS OF WORK ABSORBED PER APPLICATION	1,000,000 FOOT-POUNDS OF WORK ABSORBED PER POUND OF MATERIAL LOST
1	2	3	4	5	6	7	8	9	10
158	HOCKING VALLEY RR	S IF STREETER	22.5	22.046	90	.229	.002544	1.036	407.2
161	"	◇	21.8	21.208	94	.644	.006850	1.004	146.6
163	AT & SF RR	BXU 36 PAT EP 20 1900	21.7	19.964	118	.337	.002856	1.000	350.1
172	AT & SF R.R	G 79-B	22.8	17.180	90	.366	.004066	1.050	258.2
175	W & LE R.R	MBC STD 33	30.3	11.202	40	.690	.017250	1.395	80.8
178	"	33 IN PAT. 1.5.04	20.0	18.662	90	.364	.004044	.921	227.7
179	"	PITTSBURG BR. SHOE CO	36.8	9.298	40	.593	.014825	1.695	114.3
183	O H & N RR		38.7	7.846	60	.615	.010250	1.782	173.8
186	"	C-23	24.1	13.778	90	.615	.006833	1.110	162.5
194	L & M S RR	LAPPIN	26.5	22.730	90	.198	.002200	1.220	554.6
200	"	STREETER	22.7	15.780	90	.243	.002700	1.045	387.0
205	"	STEEL BACK L & M S CARS	23.5	17.610	90	1.058	.011755	1.082	92.0
209	"	STEEL BACK PULL. CARS	24.7	16.818	90	.593	.006588	137	178.0
215	D S S & A RR		20.9	16.354	90	.320	.003555	.963	270.9
220	C & A RR	AM. C & F CO.	26.5	13.066	91	.220	.002417	1.220	504.7

Table 1—Wear of Brake Shoes on Cast Iron Wheels.

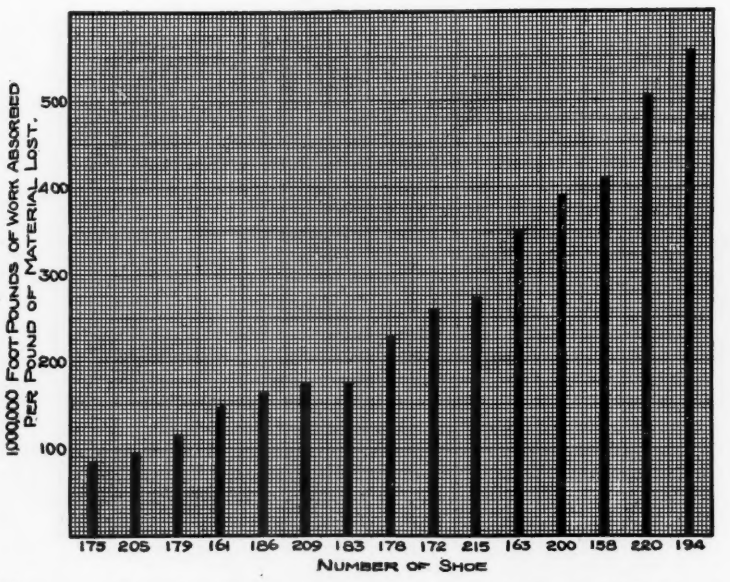


Diagram Showing Energy Absorbed per Unit of Weight of Material Lost in Brake Shoe Tests.

was thought proper to take those for which frictional results were reported last year. Fifteen such shoes were available. All had been submitted for test by railroad companies, and had been taken from service after having been about half worn. A description and photograph of each shoe, and a statement of their frictional qualities, constitute a part of the committee's report for 1906.

Tests to determine resistance to wear.—The cycle employed was that obtained by use of Gear B and the conditions were those mentioned in connection with a description of that cycle. Briefly stated they are as follows:

Diameter of test wheel	33 in.
Material of test wheel	Cast-iron
Revolutions, per cycle	800
Revolutions during which shoe has contact with wheel	190
Revolutions during which shoe is out of contact with wheel	610
Brake-shoe pressure,	2,808 lbs.
Revolutions per minute	204
Equivalent speed, per hour	20 miles
Approximate time interval during which shoe has contact with wheel	1 min.
Approximate time interval during which shoe is out of contact with wheel	3 min.

By the maintenance of these conditions it was found easily possible to secure from 80 to 100 applications in a single day's run.

Before a test, the shoe was carefully weighed on an accurate balance. It was then exposed to wear in accord with the program already set forth. A registering counter attached to the machine gave a record of the number of contacts. Weighings of the shoe made at intervals as the work proceeded, clearly showed that the loss of weight was always proportional to the number of stops. While the balance used in weighing the shoes was so delicate as to permit a determination of the loss for a single application, the values reported have in all cases been determined from a considerable number of applications for which the gross loss in weight was so great as to admit of no considerable error in determining its value. The results are given in Table I.

Basis for comparison.—It is apparent that no measurement of wear is complete which does not take into account the frictional qualities of the shoe; that a true measure must include both wearing and frictional qualities and this is best expressed in terms of energy absorbed per unit of weight of material lost. Assuming that the conditions affecting the exposure of the shoe to wear are equally fair to all shoes tested, comparisons upon this basis should constitute a satisfactory measure by which to determine the relative value of the different shoes as a means of stopping trains. Such a comparison is graphically shown by the accompanying diagram. A more detailed explanation of Table I is as follows:

Column 4 gives the coefficient of friction as reported to the convention of 1906. Column 5 is the weight of the shoe at the beginning of the wearing test. Column 6 shows the number of applications made. Column 7 gives the total loss of weight in pounds. Column 8 gives the loss of weight per application. This equals the total loss of weight divided by the number of applications. Column 9 shows the number of million foot-pounds absorbed per application. This is found by multiplying the pressure contact (2,808 lbs.) by the coefficient of friction (column 4), by the distance in feet passed over by the surface of the wheel during the application (1,640), and by dividing by one million. Column 10 shows the million foot-pounds of work which can be done by each shoe under conditions of test for each pound of material lost. It is obtained by dividing the values of column 9 by those of column 8. That the values in column 10 vary between wide limits is best shown by the diagram accompanying.

Significance of results.—In carrying out the tests all shoes were subjected to the same exposure to wear. Whether the relative results would be the same had the conditions of test involved lighter pressure or higher speeds than those which were actually employed, is a question which the committee has not yet had time to determine. It is not impossible that a shoe giving a relatively poor performance under the conditions of the test would show relatively better under some other conditions. If, for example, shoes are designed for specified service, it would perhaps be unfair to expect all to show at their best under a single condition of operation. The probability is, however, that a shoe which is good under one condition of running will not be bad under other conditions. But, as has been stated, these are questions which have not been studied, and the results as set forth in the accompanying diagram should be accepted, not as an absolute measure of the relative values of the shoes in question, but rather as an exhibit of facts obtained by a process which is clearly described and the significance of which each member will be able to judge for himself. They illustrate the sort of information which can be secured.

It is a matter of regret that no measure has yet been made which will disclose the wear of the wheel under the influence of the shoe. To secure such a measure, it will be necessary to have a balance of sufficient capacity to weigh the wheel and of such delicacy as to indicate differences in weight as small as one five-hundredth part of a pound. No such balance is now available at the laboratory. The possibility that some of those shoes which show high performance in the accompanying diagram may have been protected from wear at the expense of the wheel makes it highly desirable that precise information be had upon the print.

The preceding statements show the possibility of formulating a prescribed laboratory test covering the wearing qualities of shoes. Enough has been accomplished to reveal both the intricacies and the value of a much more elaborate study of the brake-shoe problem. It would seem that the time has come when mechanical tests could very profitably be supplemented by chemical analyses of the shoes tested, to the end that, step by step, the problem may be proven. Thus far the committee has not involved the Association in any considerable expense. It would be well if, in further expression of its interest, the Association could provide a fund sufficiently large to permit the committee to proceed actively for a considerable period along both mechanical and chemical lines.

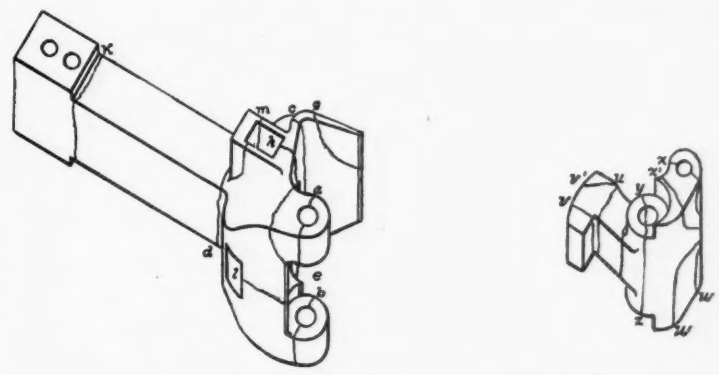
The report is signed by W. F. M. Goss, G. W. West, B. D. Lockwood.

TESTS OF M. C. B. COUPLERS.

During the past year the committee has made a thorough investigation of the breakages and failures of steel couplers with the view of obtaining some reliable data concerning the location and nature of such fractures, and to recommend such changes as will strengthen the couplers in the weakest parts, improve them, and to reduce the failures to a minimum.

An examination was made of approximately 5,000 broken steel couplers and 3,000 broken steel knuckles, together with the locks or their substitutes, of the more prominent types of couplers.

The locations of the breakages of the couplers and knuckles are shown in the accompanying diagram, and comprise the most common fractures found. For convenience, the detail breakages, which localize around a particular part of the coupler or knuckle, have been combined.



Location of Coupler and Knuckle Breakages.

The various breakages have been grouped as follows:

COUPLER.

(Combined breakages.)

"A"—Combined breakage of the lugs, comprising:
- "a"—Upper pivot pin lug.
- "b"—Lower pivot pin lug.
- "e"—Just back of upper lug.

"H"—Combined face breakage, comprising:
- "c"—Neck of the guard arm,
- "g"—Upper corner of guard arm,
- "h"—Through face into locking-pin hole.

"D"—Combined failure of the shank, comprising:
- "d"—Immediately behind horn,
- "k"—Immediately in front of butt.

Bent shank.

(Singular breakages.)
- "l"—Side-wall of head behind knuckle tail.
- "m"—Across horn through locking-pin hole.

KNUCKLE.

(Combined breakages.)

"U"—Combined breakage of knuckle-tail bearing, comprising:
- "u"—Knuckle tail immediately forward of lock bearing,
- "v"—Knuckle tail through lock bearing.

"X"—Combined breakage of coupling lugs, comprising:
- "w"—Lower lug through link-pin hole or corresponding position on solid knuckle.
- "w"—Neck of lower lug or corresponding position on solid knuckle.
- "x"—Upper lug through link pin hole or corresponding position on solid knuckle.
- "x"—Neck of upper lug or corresponding position on solid knuckle.

"Y"—Combined breakage at pivot pin hole, comprising:
- "y"—Directly through pivot pin hole.
- "z"—Immediately back of pivot pin hole shoulder.

(Singular breakages.)
- "v"—Knuckle tail behind lock bearing.

The couplers represented were not all M. C. B. standard, that is to say, only about six of the types shown on the diagrams had been tested under the M. C. B. specifications to a greater or less extent during the last two years. The latest type of couplers which have been on the market for a year or two are not shown, inasmuch as an insufficient number of these later designs were found broken to compare them with accuracy.

Breakage of 5 by 5-in. Shank Couplers.

Lug Breakage.—In the 5 by 5-in. shank couplers the lug breakages have decreased in the later type of couplers, which can be attributed to the strengthening of the lugs in design by the manu-

facturers, and the increased amount of metal which was added when the contour lines were last changed. The upper lug breakage has been the most serious of the three breakages grouped under this head, which can be accounted for by the fact that most lug breakages are caused by broken knuckle pins, the lower half dropping out and the upper half remaining in the head. In three types of couplers, the breakage "e" just back of upper lug was greater than through the upper pivot pin lug, which can readily be overcome in the design.

Face Breakage.—The combined face breakage is generally on the increase and is by far the greatest point of failure in the coupler, and it is evident that the strength of the face has not kept pace with the increasing forces which affect it. This in part results from the greater amount of attention the lugs and the shank have received in the design, and is further accounted for by the lack of room to strengthen the section, which is limited to some extent by the space occupied by the locking mechanism, particularly with the bar type of locks. The breakage through face into locking-pin hole is by far the most prominent, which is to be expected, as this is the most limited section. The guard arm breakage has run very evenly except in isolated cases, the box and rib design showing no general difference in their failures. The fracture through the upper corner of the guard arm is negligible without exception.

Shank Failures.—The combined shank failures appear least on the early modern couplers, while on the later types they are on the increase. This increase is chiefly due to bent shanks, but the breakage back of the head has also shown an increase, while the breakage immediately in front of the butt is also in the ascendancy. In almost every case of couplers having bent shanks the bend is in the vertical direction. It is believed that the shank failures can be materially reduced by more attention given the individual design of coupler by the manufacturer.

Breakage of Side-wall and Across Horn.—Of the two odd breakages, the one through the wall behind the knuckle has been quite large in three types, but is on the decrease in the latest types of couplers. There should be no breakage at this point, as there should be little strain, and the design can be changed to provide for any strength necessary without affecting any other vital part of the coupler. The breakage at the horn has been low, with one exception. As an emergency stop the horn should be designed strong enough to withstand the shocks, but with the introduction of properly designed draft gears of sufficient capacity, the trouble from horn breakage should disappear.

Breakage of 5 by 7-in. Shank Couplers.

Lug Breakage.—On 5 by 7-in. shank couplers, which are all modern, lug breakages show an even greater decrease on the later types than on the 5 by 5-in. shank couplers, and with the three exceptions are below 10 per cent. of the total breakages. Most of these couplers are equipped with the knuckle tail hook to prevent the knuckle from pulling out when the pivot pin breaks, which assists in preventing the lugs from breaking.

Face Breakage.—The face breakages are by far the most prominent and on all the types are considerably above 50 per cent. of the total breakages. The breakage into face through the locking-pin hole and the breakage at the neck of the guard arm constitute the largest percentage of the failures, and these two breaks vary in the different types of coupler; in some makes the breakage through face into lock-pin hole is the most numerous, whereas, in the other types, the neck of the guard arm is broken more frequently. The failure of the upper corner of the guard arm has become negligible.

Shank Failures.—The shank failures in three instances are above 10 per cent. of the total failures, and this is mainly due to bent shanks. The breaks immediately behind the horn and directly in front of the butt are rather constant for the different types of couplers and about uniform in the two breaks, both of which are very low, only one case reaching 7 per cent. of the total failures.

Breakage of Side Wall and Across Horn.—The breakage through the side wall of head behind knuckle tail shows excessively high in two cases, one type showing 28 per cent. and the other type 21 per cent. of the total failures. The break across horn through locking-pin hole has almost disappeared, probably due to the more efficient draft gears applied with these couplers on the later cars, which prevent the horn from coming in contact with the end sill.

Comparison of the Breakages of the 5 by 5-in. and 5 by 7-in. Shank Couplers.

Shank Failures.—The percentages of the combined shank breakages of the 5 by 7-in. shank couplers average less than 3 per cent. lower than the shank failures of the 5 by 5-in. shank couplers. Bending has been the most serious failure of the shank in the late types, and as the shank generally bends vertically, we do not obtain the full benefit from the additional 2-in. width of shank, as the additional metal is not in the right direction to stop the vertical bending most effectively.

Face Breakages.—The percentages showing the combined breakages of the face are slightly lower for the 5 by 5-in. shank couplers, but the breakage through face into locking-pin hole is lower on the 5 by 7-in. shank couplers. This is accounted for by the increased width of shank backing up the guard arm, the benefit accruing directly to the section forward of the locking-pin hole, as the guard arm failures in the 5 by 7-in. shank couplers are very much higher than the 5 by 5-in. shank guard arm failures. The results show, without question, that the weakest point of the couplers is in the section of the face immediately forward of the locking-pin hole. The neck of the guard arms should also receive further consideration in the way of strengthening.

Breakage of Knuckles.

The breakage of the solid knuckle is not confined to any particular point, but may be said to vary with the construction of the knuckle, the main failures being combined breakage at pivot pin-hole, knuckle tail behind lock bearing, combined breakage of knuckle tail bearing and combined breakage of the coupling lug.

Breakage at Pivot Pin-Hole.—The combined breakage at pivot pin-hole is divided into the breakage through pivot pin-hole, and the breakage through the tail immediately behind pivot pin-hole shoulder. The breakage behind the shoulder is more serious in some knuckles than the actual breakage through the pivot pin-hole.

Knuckle Tail Behind Lock Bearing.—The breakage of the knuckle tail behind lock bearing, or in other words, of the hook which prevents knuckle from pulling out when pivot pin breaks, has been pronounced, all but two of the solid knuckles represented being equipped with this safety device. The breakages show the value of the knuckle tail hook as well as the weaknesses. It will be difficult to strengthen this hook in most knuckle-throwing couplers, but it should be done wherever possible.

Breakage of Coupler Lug.—Lug breakage has diminished from the most prominent failure in slotted knuckles to one of minor importance in the solid type. The fracture through end of coupling lug on the upper portion of the knuckle, and the break through neck of coupling lug on the upper portion of knuckle, are the most prominent. A number of these fractures were the direct result of improperly designed cores, and of cores slipping when casting knuckles which have lightening cores through lug.

Defective Metal, Poor Coring, Etc.

The percentage of each type of 5 by 5-in. and 5 by 7-in. shank couplers, also the solid and slotted knuckles of those examined, in which the fractures could be attributed to defective metal and poor coring, should be carefully weighed in drawing conclusions, as the number of couplers examined which were broken and the percentages of same showing defective metal may be a very small proportion of the total number of couplers or knuckles in service; whereas, on another type, this ratio may be much larger, and, therefore, no deductions can be made between the different types of couplers. For example: The total number of solid knuckles found broken in proportion to the number in service was very small, and not to be compared with the number of slotted knuckles broken to the number in service. If, however, the defective metal or improper coring would be eliminated, the relative failures in the same type of coupler or knuckle would probably be reduced by the percentages shown.

The percentage of defective castings among the 5 by 5-in. shank couplers has decreased with the development, and the types which have been tested most generally under the M. C. B. specification. This also holds true in the 5 by 7-in. shank couplers, where, with one exception, the tested couplers when broken have shown less defective metal than those not tested.

In examining the broken knuckles and defective locks, the committee has found that many knuckles and locks have been purchased for repairs which were manufactured by steel foundries other than the makers of the original couplers. A large proportion of such knuckles and locks have varied from the original design to such an extent that it directly affected the operation of the coupler, which not only results in troubles from parting, but also has a direct influence on the breakage of the coupler and knuckle parts. This is aside from the question of inferior metal used in such knuckles and the fact that they are not tested under M. C. B. specifications. Separate knuckles for repairs should be purchased according to M. C. B. specifications for economy, as well as in justice to the owners of the cars who have originally applied couplers in compliance with the Interchange Rules and Standards of the M. C. B. Association.

A large number of locks, knuckle throwers and other like parts were examined. The data obtained are of no particular value for comparison, but the examination emphasized a number of points to which the committee desires to call attention.

A great majority of the lock failures were due to the breakage of the lock chain attaching the lock block to the uncoupling lever chain, which is the weak point of a lock of this type. It is not within the province of the committee to make definite recommendations concerning the form of lock, as most of the coupler patents are based on this feature, but where the flexible link connection is

used from the lock block to the uncoupling lever chain it should be strengthened.

Conclusions.

This investigation has pointed out wherein the different types of couplers and knuckles are failing, and has satisfied the committee that a closer observance of the M. C. B. specifications in purchasing couplers and the insistence of the railroads to have the couplers tested in accordance with the requirements of the Association will overcome much of the trouble from breakage of couplers, knuckles and parts which is now being experienced. The use of the M. C. B. specifications is being extended, and in this connection attention should be called to rule No. 59 of the Interchange Code, which provides that: "When using materials for repairs to foreign cars for which the M. C. B. Association has adopted specifications as a standard, the materials must comply with the requirements of these specifications." Therefore, it is a violation of the Rules of Interchange for any railroad company to apply any coupler or knuckle to a foreign car in repairs, that is not in accordance with the specifications and which has not been tested.

Defective uncoupling arrangements are an increasing source of trouble on account of the bending of the uncoupling rods, breakage of uncoupling chains and loss of pins from the clevises. The breakage of these chains is very often due to the excessive slack in the draft rigging, and as the length of chain must necessarily be limited to obtain the proper amount of lift for the locking pin it cannot well be lengthened. With the knuckle-throwing couplers the amount of lift of the locking-pin is increased, which aggravates this trouble. Some better means should be provided for operating the locking device, but the committee is prevented from making any definite recommendations on account of patented devices. In order to provide for increased strength at this point, a recommendation is appended to make the diameter of the eyelet at the top of the locking device for uncoupling rigging $1^{1}/_{16}$ in.

The lock-set within the head of the coupler is now standard, so that there is no longer any necessity for the lip on the outside bracket, shown in Recommended Practice, Sheet "B." The uncoupling lever is frequently allowed to hang on the lip of this casting while coupling cars, and when this is done it results in damage to locking-pins and sometimes causes breakage of knuckles and couplers.

Under Recommended Practice for uncoupling arrangements, all the fifth paragraph should be omitted, except the first sentence reading as follows, "Diagram No. 3 shows the application to a car having projecting end sills," to comply with this recommendation.

In order to conform to the recommendation to make standard the location of the lock lift in the central longitudinal plane of the coupler, it is recommended that diagram No. 2 be omitted from Sheet M. C. B. "B," and under Recommended Practice for Uncoupling Arrangements, fourth paragraph beginning "Diagram No. 2 shows," be omitted, inasmuch as diagram No. 2 shows the lock located 3 in. from the vertical center line of the coupler. For a similar reason paragraph seven under Uncoupling Attachments beginning with "There are some designs of M. C. B. couplers, etc.," should also be omitted.

The location of the lock lift in the central longitudinal vertical plane of the coupler, located between the striking horn and the contour lines, and operate from the top by an upward movement, was adopted as Recommended Practice in 1905. It is recommended that this requirement be advanced to standard and included in the specifications, inasmuch as all the couplers made under M. C. B. Specifications conform to this recommendation, and the best working couplers are of this design, besides which, it forms a common basis for uncoupling arrangements which is of great advantage.

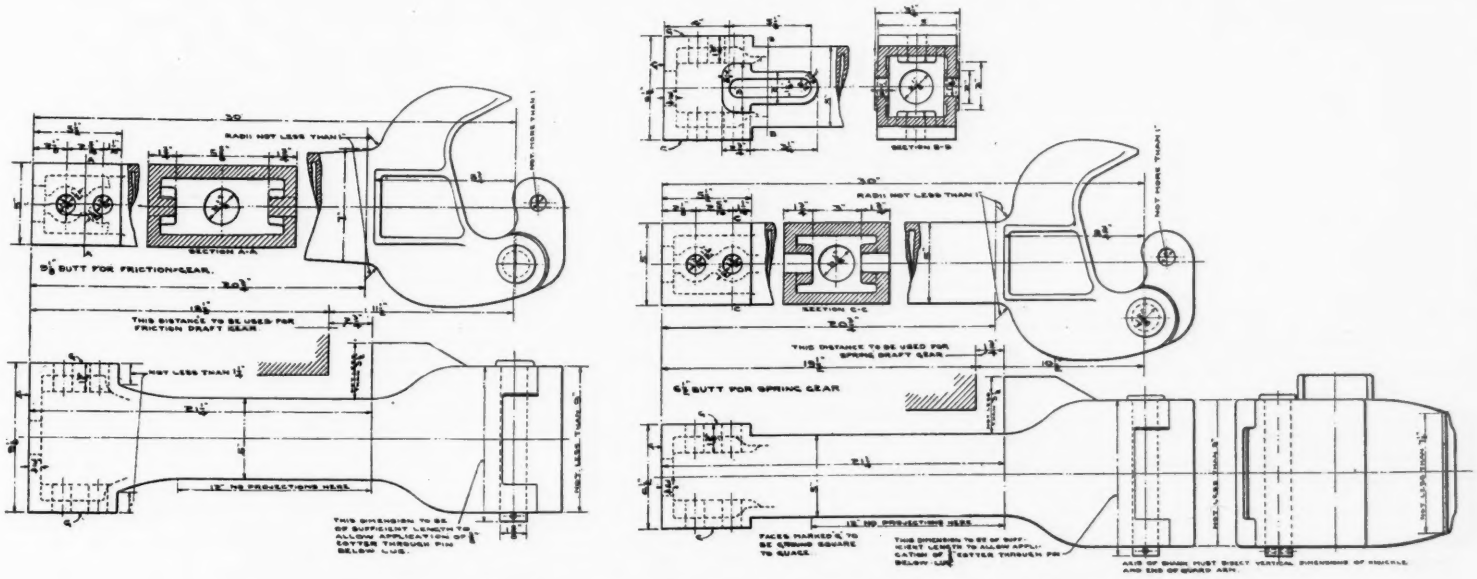
Since all couplers manufactured under M. C. B. specifications are provided with a knuckle designed not to pull out when the knuckle pin breaks, and the examination of breakages shows that this design has greatly prevented lug breakages when the knuckle-pin breaks, the committee recommends that this be advanced to standard and included in the specifications.

As the various knuckle-throwing devices employed in modern couplers have not had sufficient service to determine their working qualities or ultimate efficiency, your committee believes that this feature should remain as Recommended Practice for at least another year.

The specifications for separate knuckles while appearing under Standards, have never been adopted as such, but were made Recommended Practice in 1904. They have now been given sufficient trial and with the minor changes suggested in this report, the specifications for separate knuckles should be adopted as standard. The last paragraph appearing under this head and beginning, "Your committee has tested," should be omitted, as it is not a part of the specifications.

Attachment of Couplers to Cars.

The committee received a recommendation to increase the number of rivets in coupler butt from two to three. The proper function of the rivets should be to hold the yoke arms tight against the butt, so that the yoke gibs have a full bearing on the butt. With a three-rivet connection as an additional standard, there would be two non-interchangeable types in service, the individual maintenance of which would scarcely be justified by the increase in strength, and the need of which is doubtful. In a connection subject to lateral bending strains, such as that between the yoke and coupler, the vertical rivet method of fastening may not be the best, so until some better method can be devised, and its worth proven, it would seem advisable to maintain the parts interchangeable to facilitate repairs. In order to increase the bearing of the present yoke upon the butt, the committee recommends increasing the length of the gibs in front of the butt ½ in. on the 9⅛-in. butt couplers, which will necessitate decreasing the dimension of the opening between the gibs from 7¾ in. to 6¾ in., the remaining dimensions of the yoke to be the same as the present recommended practice.



Recommended Revised Drawing of Left-Hand Half of Sheet M. C. B. 11.

More care should be exercised by the manufacturers in casting and grinding the top, bottom and back face of the butt to insure their being square, which will increase the bearing surfaces for the yoke; also the bearing surfaces in front of butt for the gibs of the yoke. A dimension showing 1¾-in. depth of bearing, top and bottom, for rivets in the butt will also aid in this matter. The committee further recommends that the following Recommended Practices be advanced to Standards, in view of the great advantage to be thus attained in future repairs on the large number of steel cars now being constructed.

"That the spacing between steel center sills be 12⅞ in."

"That front and back stops with rivet holes $^{15}/_{16}$ in. in diameter be spaced as shown on sheet M. C. B. 'B,' drawings 'A' and 'B.'"

"That the spacing between coupler horn and buffer beam be 1¾ in. for all spring gear and 2¾ in. for all friction gear."

"That followers be made of wrought iron or open hearth steel 1⅝ in. thick for tandem spring gear, and 2¼ in. thick for twin spring and friction gear."

"That the total side clearance of the coupler be not less than

2½ in. The words 'not less than' have been added to this recommended practice in advancing it to a Standard, as the original intention was to specify the minimum clearance, and the committee is of the opinion that the increase of the clearance should not be limited at this time.

"That the butt 5 by 5½ by 9⅛ in. for use with friction draft gear be advanced to Standard."

Inasmuch as the original design of the shank has been changed in foundry practice to the square type, and since it is desirable to more definitely specify the construction of the butt and other details, the committee suggests that the left-hand of Sheet M. C. B. 11 be modified to conform to the drawing shown. This sheet shows many unimportant changes to conform to present standards, etc. The important changes other than those which have already been explained, are:

The back wall of butt changed to ¾-in. thick, inasmuch as the tail pin has fallen into disuse, and there is no need of having such a heavy block of metal on the end of the butt.

The width of the butt is changed from 4 in. to 5 in. on both sizes of shanks, as this dimension will provide for properly securing the yokes now represented in Recommended Practice, and modern couplers are being furnished with butts so constructed.

A dimension of not less than 1¼ in. is shown forward of the 9⅛-in. butt to provide for this ½-in. increased length of gib in the 9⅛-in. yokes.

A limiting dimension of not more than 1 in. is shown for the diameter of core hole in lug of knuckle to prevent a recurrence of the slotted knuckle weakness.

A note is added to the effect that there shall be no projections on the bottom of the shank from the line of the horn back for 12 in. in order that the working of the shank on the carrier iron shall not be interfered with.

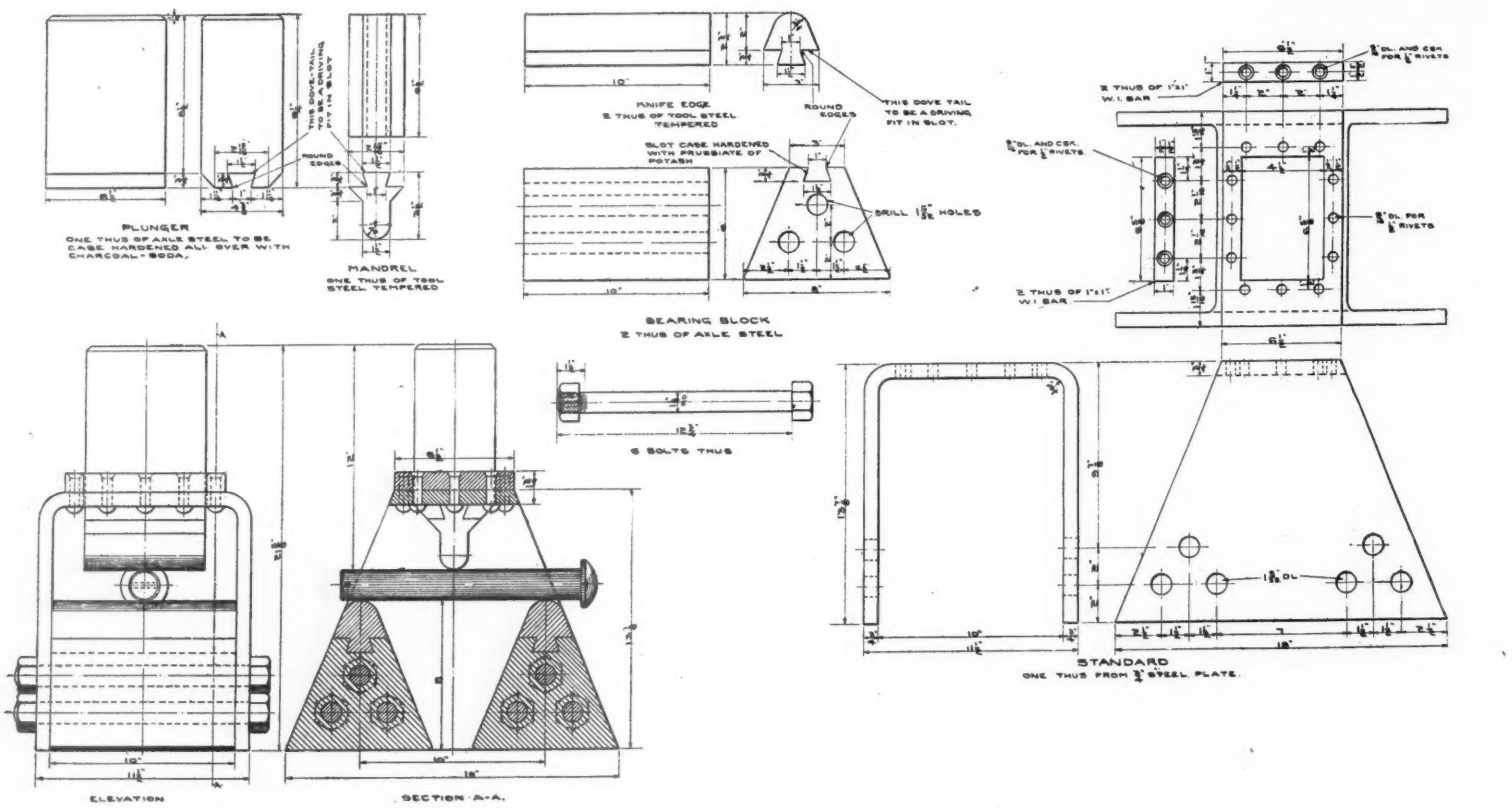
It has been suggested that the marking on couplers to indicate that they comply with the M. C. B. specifications, be stamped instead of cast, so that the letters "M. C. B." will be applied after the couplers have passed the test. This will prevent any couplers from receiving the marking "M. C. B." until they have complied with the specifications, and the committee recommends that paragraph 8 of "Specifications for M. C. B. Automatic Couplers" be changed so as to read: "8. Every coupler and knuckle made to comply with these specifications must have a slightly raised plate or flat surface cast upon the head in plain view where it will not be subject to wear. After a lot of complete couplers have successfully passed the inspection and tests prescribed below, the letters 'M. C. B.' must be legibly stamped upon the plate on each coupler and knuckle; this mark to be evidence that the complete coupler is an M. C. B. standard." This marking is as important for identification on the knuckle as on the coupler, therefore the knuckle has been included in the above. The committee also recommends that a paragraph be added to the "Specifications for Separate Knuckles" as follows: "7. Every knuckle made to comply with these specifications must have a slightly raised plate or flat surface cast upon the head in plain view where it will not be subject to wear. After a lot of knuckles have successfully passed the inspection and tests prescribed below, the letters 'M. C. B.' must be legibly stamped upon the plate on each knuckle; this mark to be evidence that the knuckle is an M. C. B. standard."

In the "Specifications for Knuckle Pivot Pins" given below, a limit gage is necessary to determine that the pins are of the proper diameter. Limit gages for round iron are prescribed under M. C. B. Recommended Practice, for sizes of round iron up to 1¼ in., and the committee suggests that the standing committee on supervision of standards and recommended practice add dimensions of such a gage for round iron of 1⅝ in. nominal diameter; the total variation allowed to be increased proportionally as compared with that of the smaller sizes. The use of this standard gage has been prescribed in the specifications.

Knuckle Pin Specifications.

Specifications for knuckle pins purchased for repairs are very necessary, and the specifications appended are recommended for adoption as Recommended Practice.

After experimenting with the various methods of testing under static loads, it was finally decided to abandon the static test and use the standard M. C. B. drop test machine as the most convenient, efficient and best method of testing. The only additional apparatus necessary consisted of two triangular shaped blocks topped by round bearing edges with a radius of ¾ in. and held by means of a suitably formed plate, 10 in. center to center, above the bearing edges. The plate was formed into a suitable shape for retaining a vertical plunger which was also provided with a round bearing edge of the same radius. It was designed to place the pin across the two lower supports and rest the upper plunger on it in the center; the whole device being placed on the anvil block of the drop testing machine. Construction of the apparatus is shown herewith.



Construction of Apparatus for Drop Test of Knuckle Pivot Pins.

Some 70 or 80 knuckle pins were secured and tested. The pins tested varied in size from 1⅜ in. to 1⅝ in. and the results obtained with each group were remarkably uniform. Each pin was subjected to a blow of the 1,640-lb. weight falling 3 ft., irrespective of the size of the pin tested. The amount of bending was measured by finding the angle included after the pin had been tested, and subtracting it from 180 deg. The amount of set was measured by noting the height of point on the vertical block before and after the test, the difference between the two dimensions showing the amount of set of the pin between supports, also including any indentation. In comparing the tensile strengths, elongations, chemical analyses, and the results of the drop test of the pins of the various groups, it was found that the method of manufacture affects the result of their test under the drop to a large extent; so that two pins of somewhat different analyses may show like results depending on their heat treatment and vice versa.

Comparing the data obtained from these tests with the results obtained from similar pins under actual service conditions, it seems advisable to specify a test which will insure obtaining a pin which is not too brittle, but on the other hand is stiff enough to stand up under service conditions. This test should require a pin to bend cold at least 15 deg., but not more than 35 deg., and not to show any fractures under a blow of 1,640 lbs. at 3 ft.

The object of using angles as limits instead of the amount of set in inches, is to eliminate the effect of the indentation by the supports and plunger. Suitable angular limit gages can be easily constructed and used for measuring the angle of deflection. These gages should be long enough to measure the angle at least 3 in. from the center of the bend on each side so as to eliminate the possibility of a false measurement of the angle.

The additional apparatus can be constructed at a small cost from the accompanying drawings and the pins can be tested at the rate of from 15 to 20 per hour, or testing three out of every 500, from 2,500 to 3,500 pins passed per hour, exclusive of the surface inspection.

Specifications for Knuckle Pivot Pins.

All knuckle pivot pins ordered under these specifications must be made from open-hearth steel properly forged and then annealed and must not be painted.

1. Knuckle pivot pins will be subject to the inspection and test of the above-named company as to their general condition and strength. The tests and inspection will be preferably made at the place of manufacture where assistance and labor necessary to make satisfactory and prompt inspection and shipment must be furnished free by the manufacturer. The testing machine, approved by the M. C. B. Association, must be used in the test of knuckle pivot pins.

2. Knuckle pivot pins will be ordered as far as practicable in lots of 500; for each lot ordered the manufacturer shall furnish three extra pins, and in the event of additional pins being required to carry out the prescribed tests, they shall be furnished free of cost by the manufacturer.

3. All pins must be of such size as will enter the plus end and will not enter the minus end of a limit gage for 1⅝-in. round iron as prescribed in M. C. B. Recommended Practices under "Limit Gages for Round Iron," and must not vary more than ⅛ in. above or below the proper length. The lower end of the pin must be cut off square and have at least ¼ in. bevel or chamfer. The cotter-pin hole to be properly drilled for ⅜-in. cotter. The head must be well formed, and pins which are not straight and true and those which have blisters or surface defects of any kind will be rejected.

Inspection.—Knuckle pivot pins, after having been thoroughly inspected by the manufacturer to see that they meet the requirements as to interchangeability, soundness, dimensions of parts, etc., herein specified, should be arranged in lots of 503. The inspector shall then inspect and gage each pin as to its compliance with drawing sizes and for surface defects.

After this inspection the inspector shall select three pins taken at random from each lot or lots, as provided for above, and subject them to the cross-bending drop test as hereafter specified. If one of the pins fails to stand the test as prescribed below, and the other two pass, three more pins shall be selected at random from the same lot from which the first pins were taken; if all three of these pins stand the prescribed test, that lot of pins shall be accepted, otherwise that lot of pins shall be rejected, and another lot substituted and tested in the same way. If two or more pins fail to stand the test, originally, the lot represented will be rejected without further consideration.

Physical Test.—The cross-bending test will be made in a standard M. C. B. drop-testing machine, the pins resting on rounded supports, held rigidly 10 in. center to center, to be subjected to a blow by the weight falling a height of 3 ft. The blow of the weight should be transmitted to the specimen by a block having a round lower edge resting on the specimen. The radius of all these round edges is to be ¾ in. All pins are to be tested cold and must not show any cracks or fractures. The bend must be directly under the nose of the plunger. Pins will be rejected if they break, or crack, or show a deflection less than 15 deg. or greater than 35 deg.

The report is signed by R. N. Durborow (Chairman), G. W. Wildin, F. W. Brazier, F. H. Stark.

RULES FOR LOADING LONG MATERIAL.

During the past year the committee has endeavored to ascertain what objections, if any, existed to the rules in their present shape. The consensus of opinion seemed to indicate that few, if any, alterations were necessary and but few changes were suggested. The general impression seemed to be that the rules should be allowed to remain in their present form.

The committee, however, has located several typographical errors, which have been corrected. For the purpose of making the rules clearer, without necessarily changing their substance, certain other suggested corrections which will involve transposing rules with their cuts, have been embodied, the idea being that by thus improving the grouping it will be easier for the inspector to locate the requirements covering certain conditions, etc.

The principal corrections and additions are as follows:

Rule 12.—Substitute "must" for "may" in middle of third line from bottom.

Rule 15-*D*.—Change the first sentence to read: "Short material may be carried on floor of gondola cars under loads carried on top of sides, but should be distributed so that the load carried over each truck as well as across floor of car is equally balanced."

Fig. 3.—Should be provided with note reading "Size of chain to conform to M. C. B. Recommended Practice" instead of the present note, "Chain to be made of not less than 1 in. iron."

Fig. 4.—Change size of cross boards to 1 by 5 instead of 1 by 6. Also make the note indicating the recommended size of stakes, and then insert note specifying, "For number and minimum sizes for stakes see sections of Rule 34."

Fig. 4-*A*.—The last line of note reading, "One-pile Rule 32—6 stakes not less than 3 by 4 on each side of cars," should be omitted.

Rule 33.—The question has been raised as to the necessity for applying binders for such shipments where loaded in gondola cars. To clear this point the second sentence should be made to read: "Strips should be located at intervals in height of not more than 30 in. from floor or top of sides of car and 6 ft. apart to act as binders."

Page 36.—Reference to Fig. 44 and clause following should be omitted. This was inserted by mistake.

Page 37.—Paragraph referring to Figs. 44 and 45, should read 45-A and 45-B.

Fig. 46.—Side strut should be 4 by 8 instead of 4 by 6, as it was in the 1905 Rules. It was changed by mistake. Also suggest a vertical post or filling piece 4 by 8 just inside of 1¼-in. rod, that is, between it and the lading, which can be shown in cut.

Rule 114.—The last sentence specifies that for "Pipe more than 18 ft. long there must be at least four pairs of stakes." This requirement would seem to be entirely proper, but where dunnage strips are used three stakes will be sufficient, and the last sentence of this rule should read as follows: "For pipe more than 18 ft. long there must be at least four pairs of stakes, but where dunnage strips are used between consecutive layers of pipe three pairs of stakes should be sufficient."

The report is signed by A. Kearney (Chairman), C. E. Fuller, A. Stewart, F. H. Clark, G. S. McKee, J. S. Lentz, W. F. Kiesel, L. H. Turner.

TRIPLE VALVE TESTS.

No new triple valves were presented to the committee for test since the 1906 meeting. The committee has been requested to test certain improvements on train brakes, but has decided that the testing of these devices did not come within its jurisdiction, and therefore declined to make the tests.

Referring to the revision of the code of triple valve tests, which was also turned over to the triple valve committee, the committee has decided that it will be impracticable to conduct a series of tests which will allow it to revise the present code until the opportunity of conducting tests on the new M. C. B. 100-car rack is available. The Westinghouse Air Brake Company has prepared the details for a 100-car testing rack with estimate of cost. This has been turned over to the Executive Committee of the Master Car Builders' Association.

The report is signed by A. J. Cota (Chairman), F. H. Scheffer, R. K. Reading, E. W. Pratt, Jas. Macbeth.

CAST-IRON WHEELS.

The recommendations of the committee covering the *increased thickness of flange and coning of the tread* having been adopted last year the committee has confined its work during the past year to the revision of the drawings and specifications, and the design of a complete set of gages of various descriptions required for cast-iron wheels, to replace those now shown in the standards and recommended practice of the Association, to suit the requirements of the new flange and tread adopted in 1906, as well as the standard flange and tread adopted by the Association and in general use prior to that date.

The committee presents the *revised drawings and revised portions of specifications*, and at the conclusion of the report calls attention to *certain rules and paragraphs in the Rules of Interchange that need revision* to make them conform to the requirements of the new standards. It recommends that the latter be referred to the committee having these rules in charge for the necessary corrections.

The recommended standard drawings of wheel tread and flanges and measurements for loose wheels or out of gage wheels are shown herewith in Figs. 1 and 2.

Specifications for 33-in. cast-iron wheels, as revised in 1904, and now appearing as Recommended Practice, have been further revised as follows:

Title of specification has been changed to read, "*For 33-in. cast-*

iron wheels, having a minimum weight of 600, 650 *and* 700 *lbs. for cars of* 60,000, 80,000 *and* 100,000 *lbs. capacity.*

The words in italics represent additions.

Paragraph 1. Chills must have the inside profile as shown on M. C. B. drawings of wheel tread *adopted in* 1906.

Paragraph 3. The wheels must show clean gray iron in the plates, except at chaplets, where mottling to not more than ½ in. from same will be permitted. The depth of pure white iron must not exceed 1 in., nor be less than ½ in. in the middle of the tread, *and shall not exceed* 1 *in. in the middle of the tread* or be less than

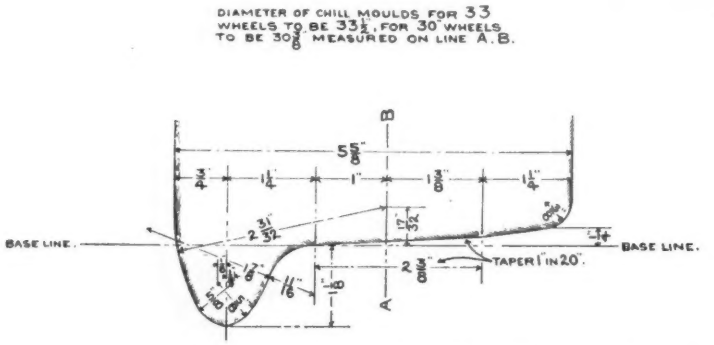


Fig. 1—Recommended M. C. B. Standard Wheel Tread and Flange.

⅜ in. in the throat for wheels *having a minimum* weight of 600 lbs. It shall not exceed 1 in. in the middle of the tread, or be less than 7/16 in. in the throat for wheels *having a minimum* weight of 650 lbs. It shall not exceed 1 in. in the middle of the tread, or be less than ½ in. in the throat for wheels *having a minimum* weight of 700 lbs. The depth of white iron shall not vary more than ¼ in. around the tread of the rail line in the same wheel.

Paragraph 4. *When ready for inspection, the wheels must be arranged in groups, all wheels of the same date being grouped together,* and for each 100 wheels which pass inspection and are ready for shipment, two representative wheels of *normal diameter,* shall be taken at random, one of which shall be subjected to the following test:

The wheel shall be placed flange downward on an anvil block, weighing not less than 1,700 lbs., set on rubble masonry at least

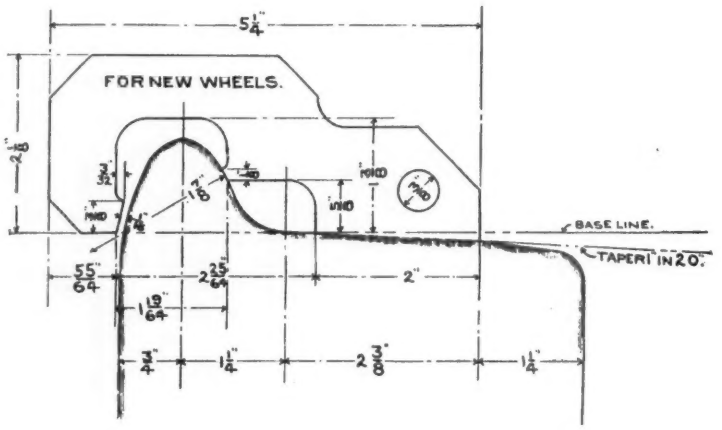


Fig. 3—Maximum Flange Thickness Gage.

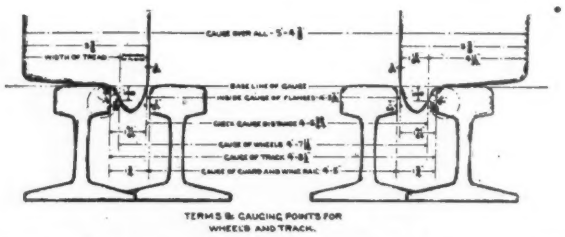


Fig. 6—Standard Terms and Gaging Points for Wheels and Track.

2 ft. deep, and having three supports not more than 5 in. wide to rest upon. It shall be struck centrally on the hub by a weight of 200 lbs.

For wheels *having a minimum* weight of 600 lbs., 10 blows falling from a height of 9 ft.

For wheels *having a minimum* weight of 650 lbs., 12 blows falling from a height of 10 ft.

For wheels *having a minimum* weight of 700 lbs., 12 blows falling from a height of 12 ft.

Paragraph 7. To be eliminated entirely and all following paragraphs to have their numbers changed accordingly.

Paragraph 8. Provided the maximum and minimum flange thickness gages as recommended by this committee are adopted at this convention, the following, "in 1907," should be added after the word Association, at the end of this paragraph.

Paragraph 9, Section 2. The words "or over" to be eliminated, making the section read, "are under weight."

The committee presents the following recommendations for approval and acceptance by the Association:

(1) The drawings of the wheel as a whole.

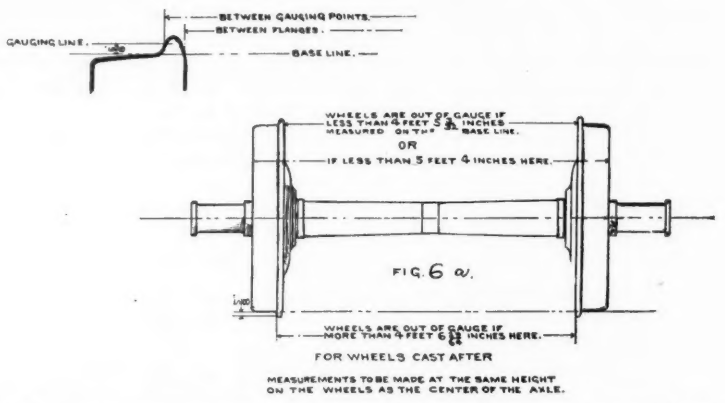


Fig. 2—Measurements for Mounted Wheels Loose or Out of Gage.

(2) The form of wheel tread and flange.

(3) The maximum flange thickness, and minimum flange thickness gages, as presented. (Figs. 3 and 4.)

(4) The wheel defect and worn coupler limit gage, as presented (Fig. 5), in which one additional slot for gaging worn flanges on wheels under cars of 100,000 lbs. capacity and over has been added.

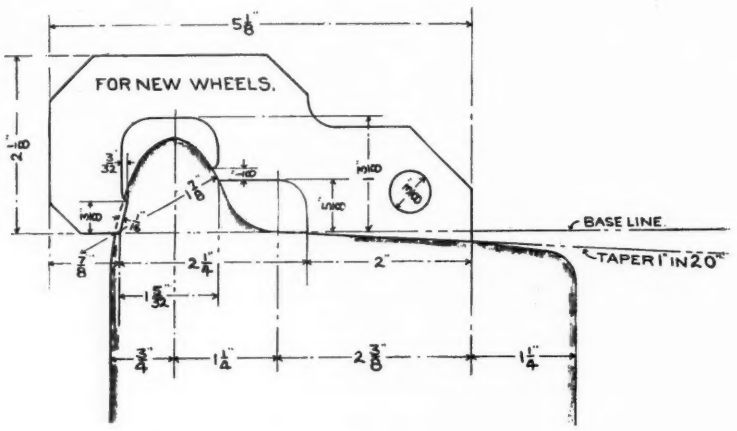


Fig. 4—Minimum Flange Thickness Gage.

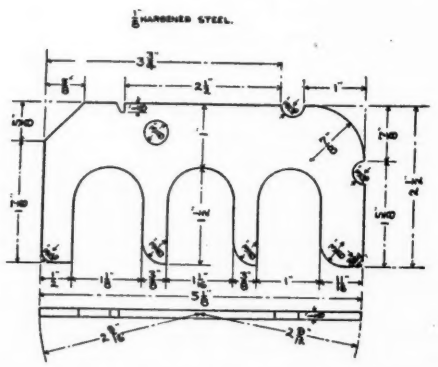


Fig. 5—Wheel Defect and Worn Coupler Limit Gage.

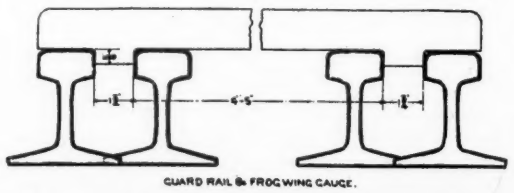


Fig. 7—Guard Rail and Frog Wing Gage.

(5) The drawings showing "Standard Terms and Gaging Points for Wheels and Track," as presented (Fig. 6), and on which the "Guard Rail and Frog Wing Gage" (Fig. 7) has been revised to correspond with the standards adopted by the Engineers of Maintenance of Way and approved by the American Railway Association,

and from which the gaging point 5/8 in. below the top of the rail has been fixed for all gages appearing on the drawing.

(6) The discontinuance of and removal from the standards of the Association of "Gage for Locating Wheels Equidistant from Center of Axle," now shown on M. C. B. Sheet 22, as same is not in current use and is not essential.

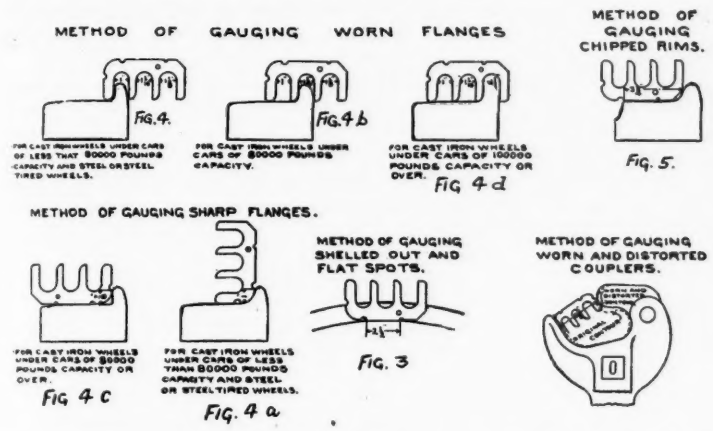


Fig. 8—Methods of Using Wheel Defect and Worn Coupler Limit Gage.

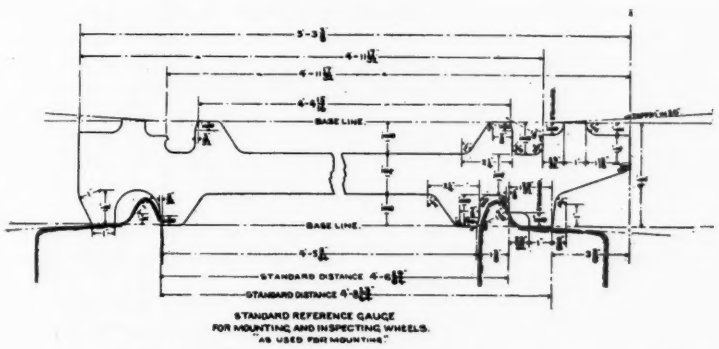


Fig. 10—Use of Standard Reference Gage for Mounting Wheels.

(7) The changes in the specification as presented.

(8) The drawing showing the method of using the wheel defect and worn coupler limit gage. (Fig. 8.)

The wheel check gage and the standard reference gages for mounting and inspecting wheels are shown herewith. (Figs. 9, 10 and 11.)

Attention is called to the following quotation, taken from the minutes of the Wheel Makers' Committee, namely: "What the Wheel Makers ask to have done is that the Wheel Committee of the M. C. B. Association make good, strong recommendations in their report to the officials of the leading railroads, that the new standard be accepted."

The committee endorses and advocates such action, since the Wheel Makers are emphatic in stating that, notwithstanding the new standards' acceptance by the M. C. B. Association, it does not mean that the various railroads will use them, and what the wheel makers want is to have the new standards put into practice so that they can afford to make the necessary manufacturing equipment and be prepared to deliver wheels promptly.

The wheel makers desire, on account of increased wheel loads and mileage, that an equitable guarantee for 600, 650 and 700 lbs. wheels be adopted by this Association. The committee does not feel qualified to frame such a guarantee on account of insufficient data concerning the performance the new wheels are going to give in actual service, and until this Association has secured such data no guarantee can be framed that will be equitable to both the railroad companies and the wheel manufacturers. The committee recommends that a service record of the performance of the new wheels be maintained by the members of the Association for a sufficient

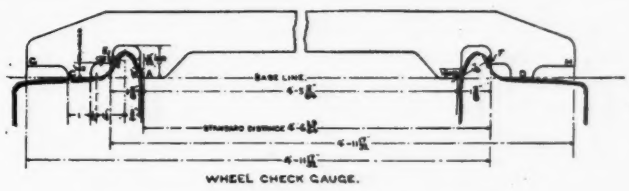


Fig. 9—Standard Wheel Check Gage.

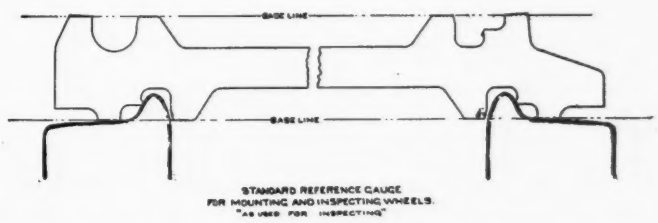


Fig. 11—Use of Standard Reference Gage for Inspecting Wheels.

period of time to determine what the wheels are going to do under the increased wheel loads and mileage, so that if it is desired by the Association to adopt a guarantee at some future time, the actual performance of these wheels can be used in determining what the guarantee should be.

The report is signed by Wm. Garstang (Chairman), A. S. Vogt, H. J. Small, W. E. Fowler, R. L. Ettinger, R. F. McKenna, J. E. Muhlfeld.

Supplementary Report of Committee on Cast-Iron Wheels.

The committee has devoted considerable time to the design of limit gages for use at shops when inspecting second-hand wheels for remounting. The gages shown herewith (Figs. 12 and 13) are designed on lines determined in actual practice by one of the leading railroads of this country, and the angle of gaging face having a taper 2¼ in. in 12 in. is the result of several years' experience,

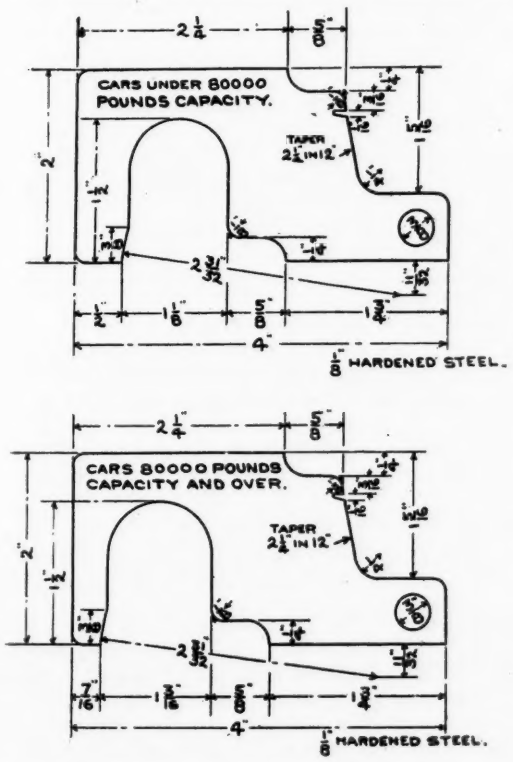


Fig. 12—Recommended Design of Limit Gage for Inspecting Second-Hand Wheels for Remounting.

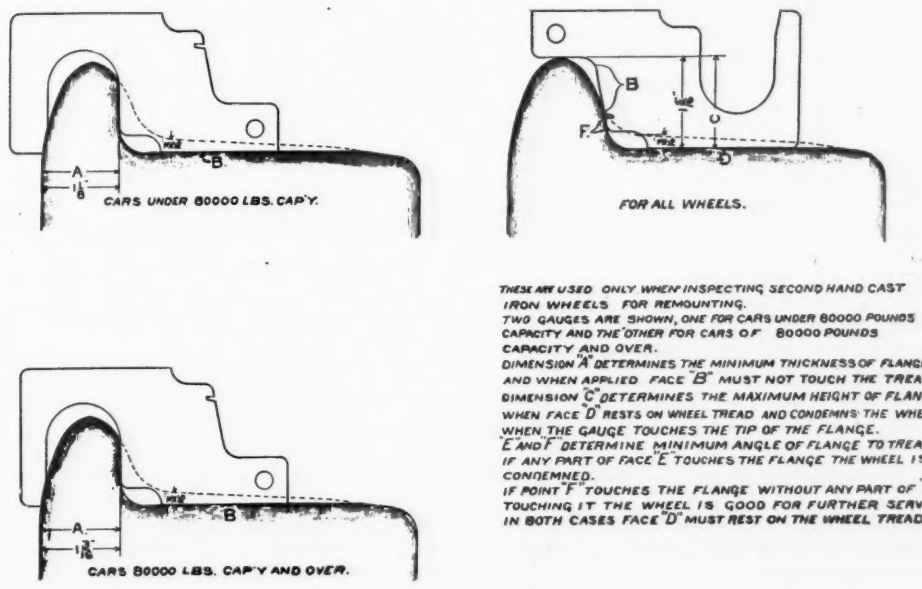


Fig. 13—Method of Using Limit Gage for Inspecting Second-Hand Wheels.

and has been found to meet requirements in a satisfactory manner. The committee recommends the adoption of these gages as recommended practice.

ARCH BARS.

The committee was instructed to consider what changes in the dimensions and shapes of the standard arch bars would be necessitated if the truck wheel base should be changed from the present standard of 5 ft. 2 in. to 5 ft. 6 in., in order to better accommodate inside hung brakes, the matter of the angularity of the brake hanger also to be considered. The committee is of the opinion that the sizes of sections used on the present standard arch bars, namely, 1½ by 4½ top, 1⅜ by 4½ bottom, and ⅝ by 4½ tie bars may be safely used in trucks for 80,000 lbs. capacity cars having 5 ft. 6 in. wheel base; the increase of the stress due to the greater span not being sufficient to warrant an increase in the sections. It therefore suggests that the drawing of standard arch bars as shown on Plate M. C. B. 19 of the 1906 Proceedings be revised, showing the same sections, and (a) that the journal bearing centers be spaced to 5 ft. 6 in., the additional 4 in. to be added to the total length, but that the following revisions be also included.

The bends next to the columns are too closely spaced, as, with the present arrangement, there is but $^{13}/_{32}$ in. between the edge of the holes and the beginning of the bend. The spacing of the bends should be increased from 18½ to 20-in. centers, and the horizontal distance between bends be increased from 16¼ in. to 17½ in. The turned-up lip on the ends of tie bars are unnecessary, and the committee recommends that they be eliminated, the total length of the tie bar to be the same as the arch bars, or 74 in. over all.

Regarding the double nuts shown on column bolts, the committee suggests the addition of a note to the drawing, reading as follows: "A single nut with a nut-lock or a cotter may be used instead of double nuts." The utility of the column bolt washer has been questioned and the committee suggests that the washer or its equivalent is desirable in order to provide suitable clearance for a fillet under the column bolt head. A note should be added to the drawing, reading as follows: "Column bolt washers may be omitted if bolt holes in top arch bars are countersunk."

As regards the matter of angularity of the brake hangers, the committee approves the suggestion of the committee on brake-beams in 1906, which reads as follows: "That brake hangers should have an angle as nearly as possible to 90 deg. from a line drawn from the center of the brake-shoe to the center of the axle, when the shoes are half worn."

The report is signed by C. A. Seley (Chairman), S. N. Dow, J. J. Ewing.

HEIGHT OF BRAKE STAFF.

The American Railway Association committee on standard dimensions of box cars requested the Master Car Builders' Association to consider the height and location of brake staff of standard box cars and adopt, if practicable, a standard height and location. The following is recommended: That the standard maximum height from rail to top of brake staff be 14 ft. and the standard distance from center of car to center of brake staff be from 18 in. to 20 in.

The report is signed by E. A. Miller (Chairman), J. E. Keegan, F. T. Hyndman.

TANK CARS.

At the 1906 convention the rules proposed by the committee were adopted with an additional provision for the stenciling by railroads of acceptable cars. This feature has not yet been put into general effect. Confusion exists at interchange points in regard to the phase of the specifications which covers construction "as strong as"; and it has developed that the same car might be accepted by inspectors on one part of a system and held up by inspectors on the same system at another point. This has entailed much delay and a considerable amount of correspondence. In consequence, a meeting was held of representatives of a number of railroads handling a large number of tank cars, and the points causing confusion were discussed and amendments suggested in the wording of the requirements.

While the severity of the service to which all classes of equipment is subjected has undoubtedly changed for the worse, and while the committee is not yet prepared to withdraw the earlier minimum requirements for tank-car construction, it feels very strongly that it is to the interest, not only of the transportation companies but, also, of the car owners as well, to very materially exceed the requirements for strength.

The committee proposes the following changes in the specifications:

Damage by Fire.—The word "cars" has been omitted from this paragraph, so as to specify that the *tanks* must be withdrawn from transportation service, which was the original intention.

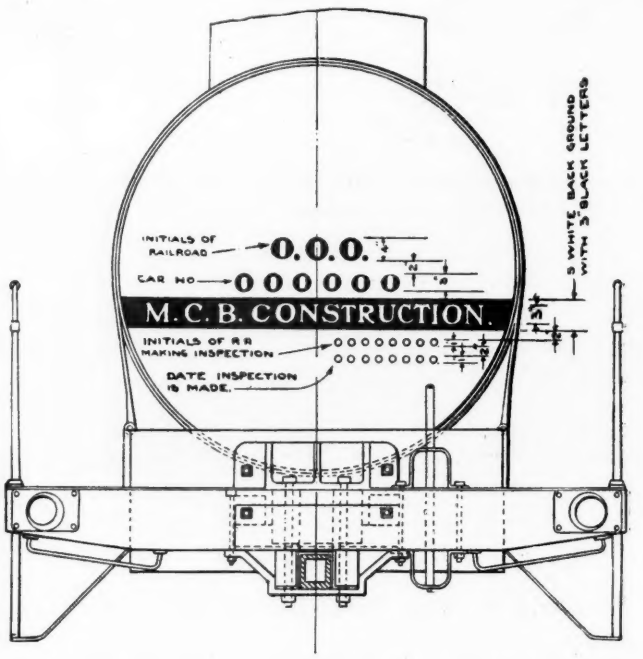
Trucks, Sizes of Axles.—This paragraph has been changed to conform to the requirements of the Rules of Interchange.

Axles.—Tank cars have been placed upon the same basis as other M. C. B. cars, giving them the advantage of the larger axle when the owners equip the cars with same.

Safety Appliances.—A change in this paragraph was made in order to bring out the necessity for securely fastening the side handrailing.

Push-pole Pockets—The modification of this paragraph was necessary in order to overcome the interference of the push-pole with the hanging step when the push-pole pockets were applied to the trucks placed above the end journal boxes.

Dome Yokes, Tank Straps, Etc.—Under this heading, the size of the tank bands and dome yokes have been further specified and reference made to the size of round and bar iron. A large number of existing cars are fitted with 1-in. rods for tank bands which are not upset for the threaded portion to 1⅛ in., and if the tank conforms to the requirements in all other details it is thought inadvisable to reject the car for this minor detail but permit it to run



Revised Marking of Inspected Tank Cars.

until such time as the car goes to the shop for repairs, when such rods must be upset to 1⅛ in. to provide for the proper strength specified.

Test.—The committee suggests changing the periodical time requirement for inspection and test of tanks with cold water pressure from five to ten years, for the reason that experience does not show such deterioration as to make the five-year period necessary. To compel tank car owners to go through this process more often than safety demands, imposes a hardship for the reason that the testing generally starts slight leaks involving the lifting of the tank from the underframe in order to perform the necessary caulking.

Inspection.—A change under this heading is made, as shown in the drawing published herewith. This is with the view of insuring that tank cars which have been inspected and stenciled by a railroad company are accepted in interchange, in so far as construction is concerned, but provides against tank cars being wrongly stenciled if they do not conform to the M. C. B. construction; in such cases, the matter should be taken up with the road stenciling the car and have the detail corrected.

The note has been changed from "Meets Requirements" to "M. C. B. Construction," which is the more suitable legend and expression of fact. The date of inspection has also been added to the cut so that any future requirements may be added as necessity may demand.

Vent Hole or Small Valve.—The paragraph relating to coal tar has been rewritten in order to more clearly set forth the requirement.

Tank Cars Having Wooden Underframes.

Center Sills.—This paragraph has been modified to include center sills of different section but equivalent in strength to the center sills specified.

Center Sill Filling Timbers.—The following sentence has been added to this paragraph: "On cars where the draft arrangement is between center sills, the filler timber must be extended to the cross-tie timber when the cars go to shops for repairs to center sills," this to provide for the proper strength at body bolster.

End Sills.—This paragraph has been modified so as to cover end sills which are reinforced by buffer blocks, specifying the minimum requirements for such end sills and buffer blocks.

Draft Timbers.—Specification in regard to seven ⅞-in. draft

bolts in each draft timber has been modified to more clearly set forth the requirements in connection with existing constructions.

Draft Gear.—A paragraph has been added to this specification, more clearly setting forth the draft stop and draft attachment requirements.

Head Blocks.—The alternate fastenings of head blocks have been more definitely specified so as to clearly set forth the fastenings which are acceptable under this requirement.

Dome Heads and Covers.—This paragraph has been changed so as to permit the use of cast-steel dome heads and covers.

New Tank Cars.

Bolsters; Draft Gear.—Reference to the friction draft gear has been omitted, it being considered unnecessary to specify any particular type of draft gear.

Cars Without Underframes.—This paragraph has been rewritten so as to more clearly set forth the original intention in regard to the riveting of the circumferential seams, which should have specified that on cars without underframes the circumferential seams in bottom sheet only, except head seams, must be double riveted.

While the committee is not ready to make any definite recommendation in regard to the modification in the present method of taking care of longitudinal anchorage, experience shows the necessity for some improved method of preventing end movements of tanks. The hitherto accepted plan of placing the tank between head blocks, more or less securely fastened to framing, may well be improved upon. Tanks are frequently steamed, resulting in material endwise expansion. With tightly fitted head blocks this may result in forcing down the ends of the car. If slackness is allowed for steaming, the tank is allowed to move endwise when cold, and inspection shows that this takes place and with serious consequences. The committee believes that the best construction should not demand the tank to fit both head blocks at the same time, but that the tank should be anchored to frame either at the center or at one end, so as to allow full freedom for expansion.

Attention has been called to the fact that on certain tank cars no facilities have been provided for jacking. On all new tank cars built, hereafter, this feature should be taken care of, but the committee is not ready to make any definite recommendation.

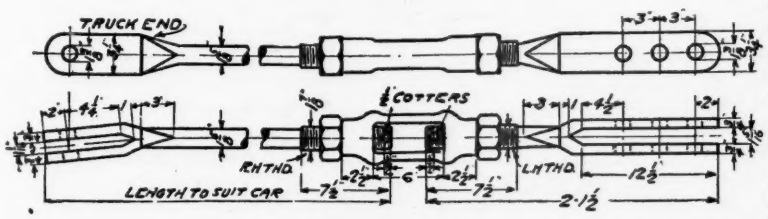
The committee recommends that the revised specifications be submitted to letter ballot for adoption as Recommended Practice.

The report is signed by A. W. Gibbs (Chairman), C. M. Bloxham and Robert Gunn.

HIGH-SPEED BRAKES.

The committee was continued from last year to report on recommended practice for high-speed foundation brake gear for passenger cars. It recommends to provide for taking up slack on six-wheel trucks, which accumulates from brake shoe wear, by substituting the adjustable connection shown; substituting this connection for the one described on M. C. B. Sheet J as B-C7-A. The proposed connection has been tried in service and found satisfactory.

To give more prominence to the maximum theoretical load which may come on beams of the various schedules the committee



Adjustable Connection for Taking up Slack on 6-Wheel Trucks; To Be Used with High Speed Brakes.

recommends that the following notes be carried under the respective schedules. On Sheet J under Table 1, "Brake-beams used with schedule A-1 should be suitable for maximum load at middle of beam of 22,000 lbs." On Sheet J under Table 2, "Brake-beams used with schedule A should be suitable for maximum load at middle of beam of 28,000 lbs." On Sheet K under Table 1, "Brake-beams used with schedule B-1 should be suitable for maximum load at middle of beam of 22,000 lbs." On Sheet K under Table 2, "Brake-beams used with schedule B should be suitable for maximum load at middle of beam of 22,000 lbs." On Sheet L under table, "Brake-beams used with schedule C should be suitable for maximum load at middle of beam of 15,200 lbs."

The report is signed by F. M. Gilbert (Chairman), S. G. Thomson, C. B. Young.

STRESSES TO WHICH WHEELS FOR 100,000-LB. CAPACITY CARS ARE SUBJECTED.

The committee is of the opinion that this subject could best be investigated at such a plant as that at Purdue University or of the Pennsylvania Railroad at Altoona where proper facilities could be had to carry out an extended study. Such an investigation should cover: First, stresses due to vertical loads imposed; second, stresses in the flange due to side pressure on curves; third, effects of brake-shoe applications and form of brake-shoe.

The report is signed by J. F. Walsh (Chairman), E. D. Nelson, O. C. Cromwell, G. E. Carson, W. J. Buchanan.

SUBJECTS.

The committee on subjects suggests the following:

For the Noon-Hour Topical Discussion.

What can the Master Car Builders do to secure the more rapid movement of freight cars and prevent delays under repairs and inspection? To be opened by J. E. Muhlfeld.

What are the advantages or disadvantages of a freight-car pool? To be opened by R. P. C. Sanderson.

The effect of hump yards on the damage to freight cars and their contents. To be opened by Le Grand Parish.

The collar wear of large axles. Should this collar have a larger fillet? To be opened by W. H. Lewis.

The damage to rails by flat spots on wheels. Should not the practice of wheel grinding be extended? To be opened by D. F. Crawford.

Subjects for Committee Investigation During the Year 1907-1908.

The lateral bracing of steel freight cars; also the proper design for the superstructure of steel box cars. The majority of wooden cars have no diagonal bracing in the underframing, depending on bolted joints and connections to keep the bodies square. In the case of a severe shock a wooden car will spring and give, but return to its former lines, while cars of steel or composite construction, on account of inability to spring after a severe shock, will remain sprung and bent out of line. The same committee to investigate the design of the upper framing of box cars. C. A. Seley, W. F. Kiesel, Jr., W. J. McKeen, Jr., Committee.

Side bearings and center plates for freight cars and locomotive tenders. Committee to recommend a standard spread, height and clearance for side bearings, review and give synopsis of reports on side bearings and center plates made to the Association in the past, since and including 1900; to present plans for the most improved anti-friction side bearings and center plates and recommend the proper proportions for ball and roller bearings. The investigation and report to embrace the relations which center plates and side bearings may bear to derailments. Alfred Lovell, H. J. Small, O. M. Stimson, C. A. Schroyer, A. W. Gibbs, Committee.

Friction Draft Gears: To recommend a standard maximum capacity. The most desirable resistance during each ⅛-in. compression. A standard maximum weight for the friction draft gear proper. The proper design for the attachment of friction draft gear. The value of friction draft gear in reducing damage to cars and their contents. J. E. Muhlfeld, F. M. Whyte, W. H. V. Rosing, R. D. Smith, Committee.

Steel Passenger Cars. To recommend a standard sectional area for the center sills and cover plates, the relative merits of steel passenger cars with an upper deck and those with a semi-elliptical section without upper deck; the best construction for flooring and relative merits of various materials for inside finish for fireproof construction. W. A. Nettleton, E. A. Benson, Representative American Car & Foundry Company, T. Rumney, R. L. Ettinger, Committee.

The ventilation and heating of coaches and sleeping cars. To investigate methods for the regulation of the temperature and the supply of fresh air to passenger cars with special attention to comfort in sleeping cars; to recommend plans which provide for the regulation of heat and air supply by the occupant of each berth. R. P. C. Sanderson, Joseph A. Buker, William O'Herin, W. E. Fowler, F. H. Clark, Committee.

Protective coatings for steel cars; the method of application and results of experiments made therefor. C. A. Fuller, T. H. Russam, F. H. Clark, S. T. Parks, Committee.

The report is signed by W. E. Symons, William Forsyth, H. LaRue.

Additional Exhibits at the Atlantic City Conventions.

The following list of exhibits at Atlantic City completes the partial list printed on pages 858 to 860 in our issue of last week:

Acme Supply Co., Chicago.—"Acme" vestibule rollers, vestibule curtains, vestibule curtain shields, car shade rollers, vestibule diaphragms and metallic weather strips.

American Brake Co., Pittsburg, Pa.—See Westinghouse Companies, RAILROAD GAZETTE, June 14, p. 860.

American Car & Foundry Co., St. Louis, Mo.—New York Central suburban passenger coach.

American La France Fire Engine Co., Elmira, N. Y.—"One Man" chemical engine; hose reel; Babcock, "Salvage," "20th Century," and "Patrol" fire extinguishers; hose nozzles.

American Locomotive Co., New York.—Reception booth with catalogues.

American Palace Car Co., New York.—Track exhibit of combination parlor, sleeping and dining car "Beaulah," built by the St. Louis Car Co.

American Track Barrow Co., Lowell, Mass.—Models of track barrows and timber trucks.

Automatic Ventilator Co., New York.—Track exhibit of automatic injector and ejector ventilators, applied to New York Central steel suburban car.

Baid Mfg. Co., Pittsburg, Pa.—The Miller quick-acting monkey wrench.

Baldwin Locomotive Works, Philadelphia, Pa.—Reception booth.

Baldwin Steel Co., New York.—Hudson high speed steel and a full line of high speed tools; also crucible tool steel.

Boker, Herman, & Co., New York.—"Novo" patent section tool steel and cutters; also "Intra Steel," a new semi-high speed steel to be used as substitute for carbon steel.

Boyd, Jas., & Bro., Philadelphia, Pa.—Boyd-Champion chemical fire engine; "Keystone" fire extinguishers.

Cambria Steel Co., Johnstown, Pa.—Track exhibit of two steel hopper cars and one low side steel gondola, all of 100,000 lbs. capacity and equipped with Coffin toughened axles.

Carborundum Co., The, Niagara Falls, N. Y.—Samples of "Carborundum," the abrasive material.

Celfor Tool Co., Buchanan, Mich.—High speed and twist drills in operation.

Chase, L. C., & Co., Boston, Mass.—"Goat Brand" mohair car seat plushes in various styles and colors.

Cleveland Car Specialty Co., Cleveland, Ohio.—Pressed steel carlines.

Coale Muffled Safety Valve Co., Baltimore, Md.—See Nathan Mfg. Co., Railroad Gazette, June 14, p. 860.

Crocker-Wheeler Co., Ampere, N. J.—Photographs showing application of motor drive to machine tools; also form I-F field-weakening motor.

Crucible Steel Co. of America, Pittsburg, Pa.—Tool steel forgings; twist drills made of "Rex A" high speed steel; flat and round bars of "Rex A" and tempering steel.

Dahlstrom Metallic Door Co., New York and Jamestown, N. Y.—The Dahlstrom all-steel hollow-construction door and cold-rolled steel car trimmings; views of standard Long Island R. R. passenger coach and track exhibit of New York Central coach built by the St. Louis Car Co. trimmed with the above.

Damascus Brake Beam Co., Cleveland, Ohio.—"Damascus" and "Waycott" brake beams.

Davis, John, Co., Chicago, Ill.—Back pressure and reducing valves; pump and air regulators; armored hose.

Davis Expansion Boring Tool Co., St. Louis, Mo.—Davis expansion boring tools.

Ehret Magnesia Manufacturing Co., Philadelphia, Pa.—Reception booth.

Fibrous Paint Co., Philadelphia, Pa.—"Fibrous" paint under demonstration to show its adhesive, flexible, water- and acid-proof qualities.

Forsyth Bros. Co., Chicago.—Chaffee drawbar centering device; Stucki radial drawbar centering device; Forsyth buffing mechanism; metallic sash; draft rigging and drawbar controlling devices.

France Packing Co., Philadelphia, Pa.—France metallic packing; fibrous "Steam Stopper" packing; rubber sheet packing; France grease cups.

General Electric Co., Schenectady, N. Y.—Photographs of electrical apparatus and installations.

Gisholt Machine Co., Madison, Wis.—Photographs showing Gisholt lathes, vertical boring mills and universal tool grinders.

Gould Coupler Co., New York.—Gould Z-beam steel platform with friction buffer and friction draft-gear for passenger cars; Gould steel freight couplers; Gould malleable iron journal boxes; "Crown" steel body and truck bolsters; Gould wing body bolster; malleable iron draft arms; Gould friction draft gear for freight and locomotive service; Gould tandem draft gear for wood and steel sills; spring buffers; tender couplers; Gould improved vestibule; "Crown" truck bolster for 30-ton cars, showing casting unfractured after bending test of 250,000 lbs.; steel castings; Gould steel freight coupler with side unlocking device.

Grip Nut Co., Chicago.—Square and hexagon grip nuts in all sizes.

Hess-Bright Mfg. Co., Philadelphia, Pa.—A standard set of Prussian State Railroads axle and wheels equipped with Hess ball bearing journals that have had 65,000 miles of service.

High Duty Saw & Tool Co., Eddystone, Pa.—A 52-in. diameter standard Tindel inserted tooth saw; a 36-in. diameter structural saw.

Home Rubber Co., Trenton, N. J.—"M. B. O." brand air pump and sheet packings and steam hose.

Kansas City Railway Foundry Co., Kansas City, Mo.—Rogers journal box, waste box and engine journal cellars; also Fisher grain door.

Keystone Nut Lock Mfg. Co., Pittsburg, Pa.—The Smith nut lock as applied to arch bars, trucks and draft rigging.

Koppel, Arthur, Co., Pittsburg, Pa.—Industrial railway materials.

Landis Machine Co., Waynesboro, Pa.—Two-inch double head bolt cutter with full equipment for threading and nut tapping; also samples of work.

Latrobe Steel and Coupler Co., Philadelphia, Pa.—Latrobe, Chicago and Melrose freight couplers; Latrobe Lewis-Seley engine coupler; Goodman cast-steel drawbar yoke and wrecking hook.

Lawrenceville Bronze Co., Pittsburg, Pa.—"Corinthian" bronze driving-box brasses and rod brasses; "O.K." quick union; "K. & S." malleable bronze.

Love Brake Shoe Co., Chicago.—Armbrust car and locomotive brake shoes and brake heads.

Lucas, John, & Co., Philadelphia, Pa.—Lucas coach and car colors; stains; fillers; varnishes, and the "Mirac" varnish and paint remover.

McIlvain, J. Gibson, & Co., Philadelphia, Pa.—Samples of domestic and foreign hardwood lumber.

McGuire Cummings Mfg. Co., Chicago, Ill.—McGuire car door brackets.

Massachusetts Mohair Plush Co., Boston, Mass.—Plush covered car seats and samples of car plushes.

Metal Plated Car & Lumber Co., New York.—Full size section of N. Y. N. H. & H. coach, equipped with the Brown metallic window strip; section of metal plated car.

Modoc Soap Co., Philadelphia, Pa.—Demonstration of "Perfectol" car cleaner on P. R. R. passenger coaches on exhibit tracks; reception booth in ball room.

Moran Flexible Steam Joint Co., Louisville, Ky.—Moran flexible joints for steam, air, liquid, and gas; also trolley controller.

Morgan & Wright, Detroit Rubber Works, Detroit, Mich.—Morganite throttle stem packing; piston rod-packing; steel sheet packing, and engine and tender hose.

National Roofing Co., The, Tonawanda, N. Y.—"Security," "National," "Crystalite" and "Royal" brands of ready roofing.

National Tube Co., Pittsburg, Pa.—Track exhibit of steel gondola car loaded with pipe and equipped with tubular telescopic steel stakes and wire cross ties.

Oil Well Supply Co., Pittsburg, Pa.—Railroad special globe valves.

Ostermann Mfg. Co., Chicago.—Ostermann grain door.

Otis, Spencer, Co., Chicago.—Hutchins car roofs; Solid Steel Tool Co.'s forgings and Tyler Tube & Pipe Co.'s tubes.

Pennsylvania Railroad.—Track exhibit of a 60-ft. all-steel postal car built at Altoona from the company's designs.

Phillips-Laffitte Co., Philadelphia, Pa.—Laffitte welding plates.

Pyle-National Electric Headlight Co., Chicago.—Rest room and booth.

Riverside Metal Co., Riverside, N. J.—Phosphor bronze; German silver and white metal ingots; also castings, sheets, rods and phosphor bronze wire ropes.

Roadhouse Steam Coupler Co., Detroit, Mich.—Steam hose coupler.

Rostand Mfg. Co., The, Milford, Conn.—The McCarthy baggage rack for passenger cars. Collection of old style racks showing the evolution of the baggage rack; full size section of a standard N. Y., N. H. & H. coach, showing application; photographs.

Rubberset Brush Co., Newark, N. J.—"Rubberset" paint brushes for railroad use.

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.—Steel nuts and bolts for locomotive and car work.

St. Louis Car Co., St. Louis, Mo.—Track exhibit of combination parlor, sleeping and dining car "Beaulah," built for the American Palace Car Co.; also steel trailer car for suburban service built for the New York Central & Hudson River and fitted with injector and ejector ventilators made by the Automatic Ventilator Co., New York.

Scullin-Gallagher Iron & Steel Co., St. Louis, Mo.—Booth and rest room.

Sectional Grain Door Co., Indianapolis, Ind.—Sectional grain door.

Societe Generale des Freins Lipkowski, Paris, France.—Chapsal-Saillot long freight train brake.

Standard Coupler Co., New York.—Sessions-Standard friction draft gear. Reception booth.

Taylor, Jas. L., Mfg. Co., Bloomfield, N. J.—Screw clamps of various sizes and designs.

Summers, H. J., Chicago.—Automatic releasing vestibule curtain hook.

Timms, Jas. & J. O., Columbus, Ohio.—The "Excel" automatic car coupler.

Toomey, John A., Chicago.—Folding car stake for flat cars.

Universal Railway Equipment Co., Jackson, Mich.—Sample of "Easy Lift" grain door.

Washburn Steel Castings & Coupler Co., Minneapolis, Minn.—Washburn car and locomotive replacers; cast-steel bolsters; buffer beams; friction draft rigging; car and locomotive couplers, etc.

Wendell & MacDuffie, New York.—Gutelius asbestos ventilating smoke-jack; "Century" asbestos shingles and building lumber.

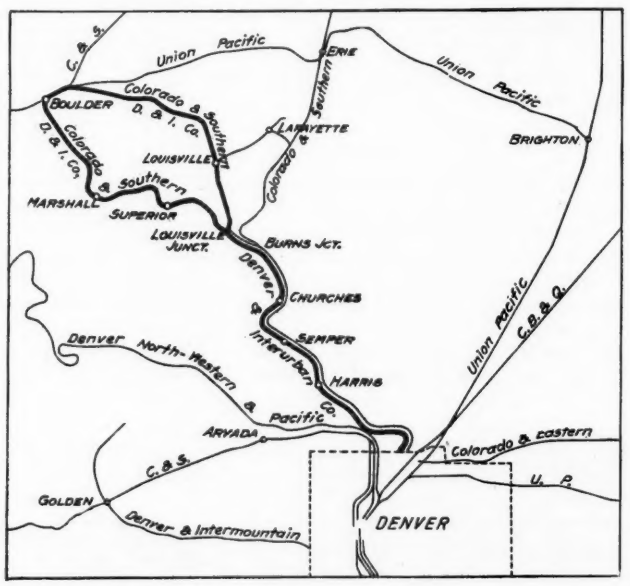
Western Railway Equipment Co., St. Louis, Mo.—Linstrom siphon pipes; car doors; Western truck end castings; Economy slack adjusters; Western bell ringers; door fastenings; Acme slack adjusters; Western sill pockets and carlines; Western brake-jaws; Hoerr tandem draft gear and Linstrom eccentrics.

Wood, G. S., Chicago.—Air brake hose protectors and mechanical rubber goods. The Harlin coupler.

The Denver & Interurban's Electrification Plans.

The organization by officers of the Colorado & Southern of the Denver & Interurban Company and an outline of its plan for building electric railroads and electrifying certain lines of the Colorado & Southern were given in these columns about the time of the company's incorporation (Oct. 14, 1904, p. 121, General News Section). Nothing was done toward carrying these plans into effect until recently. The company now has under way a line from Denver to Boulder, 44 miles, as shown on the accompanying map. From Denver to Louisville Junction, 16 miles, is to be on private but independent right-of-way, parallel to the Colorado & Southern. From Louisville Junction to Boulder the electric line will use the Colorado & Southern tracks to Boulder, and from Boulder, by the loop shown, back to Louisville Junction.

The company will buy power from the plant of the Northern



Colorado & Southern Electric Line to Boulder.

Colorado Power Company at Louisville. The line will be overhead construction, poles on one side, with brackets and suspended catenary construction. The trolley line will carry alternating current at 11,000 volts. At the Denver city limits the new line connects with the tracks of the Denver Tramway Company, which uses overhead construction and direct current. These will be used to the heart of the city. Transfers will be issued to all lines of the Tramway company.

It is expected to begin service about December 1. The initial equipment will be 10 motor cars and six trailers, the cars to run in multiple. Plans for these cars are not yet fully decided on, but they will be 56 ft. long and 9 ft. wide, and have a seating capacity of 60, except the combination cars, which will have baggage compartments. The motor cars will be equipped with four 125-h.p. a.c. motors with Baldwin trucks.

Besides this line, this company also is building a street car line in the town of Fort Collins, 74 miles north of Denver on the Colorado & Southern. Seven miles of line will be built this year. The power for this will also be furnished by the Northern Colorado Power Company and will be delivered to the street car barn in Fort Collins at 60,000 volts and there stepped down and converted into direct current. Four motor cars have been ordered in Denver, and two motor cars and four trailers are to be ordered in the East.

The Master Mechanics' Convention.

The fortieth annual convention of the American Railway Master Mechanics' Association was held on the Steel Pier, Atlantic City, N. J., June 12, 13 and 14. President J. F. Deems (New York Central Lines) called the meeting to order at 9.45 a.m. The address of welcome of Mayor Stoy, of Atlantic City, was responded to by A. M. Waitt, following which President Deems delivered his address, which was in part as follows:

PRESIDENT'S ADDRESS.

* * * Did you ever stop to think that Omaha, or even Denver, is to-day, thanks to our railroad service, nearer to New York City than Philadelphia was in 1764, when Benjamin Franklin amused himself for three and a half days knitting stockings in a stage coach while going from the Quaker City to New York to sail away to the other side in connection with some diplomatic service at the Court of St. James? History makes no record of a development that is in any way a parallel to that which has taken place in connection with the railroads on this continent, and I dare assert here this morning that no organization, that no association as such, has done so much in this grand achievement as the one represented here to-day. The history of this association of earnest men is written in the progress of the nation, which of all nations the world is proud to call great. Throughout all time all great works have been effected by earnest men—few or many—brought together by a common object or a common impulse, whether conquest, colonization, political achievement, struggle for independence, or the defense of that which men hold most dear—this country, although young, bears upon its breast many medals and memorials to those who have devoted their lives to leadership in sanguinary strife. Monuments to military achievement are most common in the Old World. Every land across the sea is dotted with those memorials which in their mute eloquence bear testimony to the fact that the world loves, honors and reveres those who have given their best for her glory, even though many of the causes for which they contended were never important, and have long since been forgotten. Where man has died for man is sacred ground, and while to those heroes we humbly pay the homage of our tears, let us hope that the day of the military hero is passed, passed never to return, and that in his place is one who leads on and ever on in that greater development which stands for that future which means sublimer peace, a larger hope, greater happiness and a better humanity.

No war-bronzed veterans ever had deeper inspiration or greater cause for self-forgetful devotion than had the pioneers who bore the brunt of the early days of the development which this association has so splendidly advanced. All the honors accorded to military achievement in the past but illy compare with those which the future will gladly erect to the memory of the men who have given us that grander, that more useful development, transportation, without which to-day the world would be largely a waste. Our predecessors met in a small way and singly the problems which we and those who follow us must meet collectively and in a larger sense, and to solve which it will be necessary to form great combinations that must be harmonious, cohesive and permanent. It is no slight task to conceive and build a structure that will provide for the interchange of people, the mutation of ideas and the physical distribution of that which enters into man's every need. We are fortunate in that our fathers built so well; let us hope that those who follow can truly say the same of us. Let us devote ourselves seriously to the problems of to-day, chief among which is to try to do as well the things that come to our hand as our predecessors did with the smaller things that came to their hands.

A legacy has been bequeathed us, a legacy for which all preparation has been made, a legacy of opportunity which looms large in the future and awaits with rich reward the man who is prepared. We have received; what shall we give? We have inherited; what shall we bequeath? What shall we leave to aid in solving the problems of the future, many of which may be much more perplexing than those we are called upon to solve to-day? We may work in brass and steel and leave the most perfect mechanism; we may develop and improve and solve methods and practices until nothing more can be desired; we may reach perfection in all these in mechanism, structure and method and yet our bequest be a failure and itself a burden unless we provide that which is paramount, which is over and above the sum total of all of this, and for which even to-day events throughout the world are crying aloud—the man. A man prepared, experienced, earnest, hopeful and happy, consecrated to his work and ready to the hand of the future.

This, my friends, as I see it, constitutes our greatest opportunity, our most imperative, our most sacred duty. If the man is provided, the machine will cease to be a burden and methods will come forth as the buds at the kiss of spring. Our own future, and the hope of that larger future which lies beyond, depends on our efforts and our success in providing those who are to help us to-day, and upon whom at no distant day must fall our duties, our opportunities, our honors and our failures. Have we any greater, grander, more sublime obligation than this? Can we justify a pride in our life-work if we fail in this? If I can but bring to you this single message, if I can inspire you with this one thought, I am content.

The Secretary's report showed two members transferred to the honorary roll, 10 deaths, 12 resignations and six dropped during the year. There were 66 new members added and two reinstatements, making a total membership of 876, divided as follows: 819 active, 17 associate and 40 honorary. The balance in the treasury was $2,739.

The Secretary reported that there would be a vacancy for four scholarships at Stevens Institute of Technology, beginning with the next college year; also that the Ryerson & Sons' scholarship at Purdue University, the present holder of which graduates this year, would be continued for another four years.

W. C. Ennis, Henry Elliott and G. S. Allen were transferred to honorary membership, and J. Snowden Bell and Lawford H. Fry were elected to associate membership.

Before proceeding to the regular business on the programme President Deems spoke of the excellence of the exhibits made by the Supplymen's Association, and advised the members to devote a certain period each day to looking them over, as it would be to the material benefit of all members.

DISCUSSION OF REPORTS.

Mechanical Stokers.—The committee submitted, only a brief progress report, and there was little discussion of this subject. Mr. Walsh (C. & O.) mentioned an interesting point in declaring that with the substitution of wide firebox engines for those having long, narrow fireboxes the necessity for mechanical stokers had practically disappeared.

Shrinkage Allowance for Tires.—F. J. Cole, chairman of the committee, presented the report. Mr. Waitt spoke of the prevailing practice in Europe to use driving-wheel centers cast solid and of the contrary custom in America. Professor Hibbard (Cornell University) asked why in the shrinkage recommendations there was an allowance of one-eightieth of a foot for 66 in. in diameter and under, and then a sudden jump to one-sixtieth of a foot for diameters in excess of this. David Brown (D., L. & W.) thought that the rims of the wheels are being made too narrow; that by the time the necessary coring is done and the tire fitted on, the available surface for the shrunken tire to exert its pressure on is too much reduced. Answering Mr. Waitt, Mr. Cole said that there were at least three or four foundries in this country that will make the solid rim centers, which, of course, are preferable where shrinkage strains are properly cared for. Regarding greater width of rim, he said the committee recommended this, and there would be no objection to making them solid except on small locomotives with very heavy rods and pins.

On motion, the committee was instructed to prepare its recommendations in the form of a letter ballot for submission to the association, these recommendations to include one concerning retaining rings as against shoulders either on the tire or center.

Locomotive Lubrication.—Much of the time given to this report was taken up by different members citing incidents within their knowledge of unusual performances with a given quantity of oil, and occasionally no oil at all, the point in most cases being to show that it depended almost entirely on the engineman as to the mileage got from a given quantity of oil. It appeared that if enginemen cared to devote the time and attention to the matter they could make excellent oil records, but most of them thought the saving did not repay the amount of trouble and constant care necessary.

The superior results in lubrication of automobiles, as compared with locomotives, were referred to and the suggestion made that if with the latter similar methods could be employed it might give equally good results. In answer, however, attention was directed to the difference in operating conditions of the two machines, the shutting off and drifting with locomotives causing particularly adverse conditions as regards cylinder and valve lubrication, which, of course, is not present in automobiles.

There was also testimony regarding the importance of properly locating the steam chest plugs, and from some members concerning good results obtained from grease.

Apprentice System on New York Central.—This was intended originally for a topical discussion, but the description prepared by Messrs. Cross and Russell (N. Y. C.) had been printed and distributed as a report. Its presentation aroused so much interest that the entire time of the first day's noon-hour discussion period was devoted to it, and it was continued to the following day. A. M. Waitt said: "At the present time there is no more serious problem confronting the railroads, and especially the mechanical department of railroads, than the future relationship between the employees in the mechanical department and the companies. We find that probably as much of the time of motive power officers is taken up in considering the difficulties of the labor problem as is devoted to strictly technical subjects of the department. The growing tendency to specialization seems to have led to a lack of general all-around mechanics in the shops. It has been noticed in probably every shop in the country that there is a great

dearth of suitable men when a good man is desired for a foreman and the man in charge of the shops, or of the department looks about to find a man of the right caliber and a man who has enough of general information on his department work to be put in charge of men. That problem has got to be faced, and it seems to me that this step that has been taken by the New York Central Lines, on a comprehensive and broad scale, is one of the most important steps that has been taken by railroads in this country for a long time. I think there is nothing more important for the future good of railroads, in the mechanical department, for raising the standard of mechanics in the shops than the establishment of a thoroughly comprehensive and wisely carried out system for educating apprentices, so that we can have all-round mechanics and men who will not simply know one little specialty and take no interest outside of that. There has been a tendency lately, in connection with various organizations to lower, seemingly, the standard of efficiency of the men. I believe that a system, such as has been outlined by Mr. Cross, is one of the steps to offset that tendency and to raise permanently for the future the standard, as it should be raised, so that instead of going through our shops and comparing the present class of men with those of 15 or 20 years ago, and commenting as we do now that they are not up to the old standard, that we may in five or ten years from now look through the shops and find the standard constantly improving, and so that others may look to the railroads as an example of the best methods of raising the caliber and the general standard of the mechanics. There is a common tendency in shops for general foremen to feel that they must, in taking young fellows into the shop and training them eventually to become mechanics, to get all that they can out of them, to get all the value possible at first from their services, forgetting that one of the desirable features in training apprentices is to make them first-class workmen. The value cannot come in the first years of their apprenticeship, but just as surely as they are properly trained the value will come to the company and to the community at large from their services after they have been properly trained. I think we should not forget to make the proper training of the young men the first consideration and the getting of the value of their services in the first years of their apprenticeship secondary, and surely the best results will come in the end by carrying out that principle."

H. Emerson (Coun. Engr.): It may be of interest to give a statement of what apprentices were doing under the old system, which I hope will soon become obsolete, and perhaps some time in the future it may be possible to find out what they are doing under these new systems that I hope to see spread. In the boiler shop (on the Santa Fe) we had 23 apprentices whose average efficiency was 87 per cent. in the work that they did. The efficiency of the whole shop, including the apprentices, was 94 per cent., so that the apprentices, as a rule, were below the efficiency of the men. On the list I find one apprentice with an efficiency of 136 per cent. and another with an efficiency of only 43 per cent. In the machine shop there are 56 apprentices with an average efficiency of only 69 per cent. The first man on the list has an efficiency of 136.8 per cent., the next man an efficiency of only 33 per cent., showing the tremendous variation in individuals. The first man is four times as good as the second man, and my impression is that throughout life he will steadily gain, as time goes on, and he will not be only four times as good, but ultimately 10 or 20 or 100 times as good. One of the features that perhaps is necessary is to check up the apprentices throughout their course of service with reference to their efficiency so as to encourage those who show a high degree of efficiency, and if possible divert those that show no ability whatever into other walks of life. During the time of apprenticeship, more than at any other period of life, it seems to be necessary to impress upon the apprentice the question of his own efficiency, that what he is learning is not simply to absorb a certain amount of knowledge, but to carry it into actual work, so that he himself becomes efficient.

D. R. MacBain (Mich. Cent.): We found when we were trying to carry out our old system of apprenticeship work, when we undertook to have the apprentices attend a course of instruction for an hour or an hour and a half after the work of the day, we got little results out of that practice; the boys did not put the enthusiasm into the work which they are doing now. Also since the inauguration of the new system, and particularly within the last five or six months, since the thing has become advertised, we are getting applications from a much better class of young men than before. They have learned that our apprenticeship system is very much like a fairly good technical education when the young man starts in. For that reason the applications are very numerous and are many more than we can take care of.

G. M. Basford (Am. Loc. Co.): Nearly all railroads and industrial establishments have preached apprenticeship and nearly all have made serious efforts to practice it. In spite of this, it would probably require from 40 to 70 years for most of these establishments to recruit their service of skilled labor through apprenticeship if they relied upon present methods for the purpose. We need definite systematic apprenticeship, adapted to present conditions. Even if we had plenty of apprentice material shop people are too busy to teach boys, and if the boys are put into the shop organization to learn trades under prevailing conditions they will quickly absorb much that is harmful and more slowly learn some of the things we wish them to know. For 60 years the British navy has profited by a plan somewhat similar to the one described.

Professor Hibbard (Cornell Univ.): The trade schools of Germany have taken a position in educational matters in Germany that is practically unknown in the United States. I hope that the influence of this paper and the influence of the New York Central Lines in the progress that they are making, and will make in this regard, will stir up our public school educators, so that something will be done to put us on a par with Germany's manual training and manufacturing education.

W. McIntosh (C. R. R. of N. J.): In former methods of apprentice instruction the effort has always been made to give the boys instruction outside of the regular working hours, expecting them to go back to the works after the regular hours of the day and to give considerable time at night to instruction. It is not surprising that that did not prove successful. The plan to give instruction during regular working hours is one of the important features of the system, and one that is absolutely necessary to meet with success. In 1905 we established a school in connection with our road very much on the lines here described. We have 60 students under instruction at the present time, and some of them are advancing very rapidly.

Le Grand Parish (L. S. & M. S.): This method of instructing apprentices is a good, sound business proposition—no charity in it. We have found that by thus instructing the boys we get a much greater output from them. We are not losing anything in the matter of dollars and cents—from the financial point of view we are gaining.

W. B. Russell (N. Y. C.), one of the authors of the paper, gave a long description of certain of the features of the work, the methods, etc., in the course of which he said: "The two features of the work are the drawing courses, and what we call the problem courses, which will mean a good deal in the long run. The drawing courses for apprentices are nothing new, but this method of teaching drawing is different from anything I know of in this country. The geometrical work which ordinarily takes a year or two in most evening schools is omitted entirely. The boy starts immediately on practical work, being called upon to deal with actual conditions. The geometrical knowledge may be necessary, but that is introduced as it is wanted. We do not teach him the principle and then let him apply it, but teach the application and the principle at the same time, the idea being to keep the object in view all the time to accomplish something definite, and not the idea of the theory of training. * * * The problem work is unique in this respect, that we have nothing to fall back upon. We found it impossible to use text-books. There is nothing in the country at the present time to fit the needs of an apprentice in the machine shop, and it has been necessary to start from the beginning. * * *

"We are endeavoring as rapidly as possible to bring in experimental work, not the kind the colleges have, because we are not trying to prove the laws of nature, but the kind that will show the reason for things. We have introduced at most points a small engine, because we have found many apprentices did not know what a valve was, nor understand the definition of lapping and leading in the class room, but they can see these things on the actual locomotive. I think every machinist in our class will be able to set valves before he graduates.

"It was stated this plan would not work where piece-work was inaugurated. It will work equally well with either piece-work or day-work. We have it on both plans. Specializing and not piece-work is to blame for the present condition of lack of apprentices. This plan will also work in a small shop, and we expect to put it in shops where there are only five apprentices. It may be that the shop instructor and the educational instructor will be one and the same man in that case, but he will be able to give lots of his time to this work. Provision is made for the college man. We have no objection to the college man's taking our regular apprenticeship course. Many instructors in the college are taking that view of the matter. Provision is made in the apprenticeship regulations for allowance to be made for previous experience, and that covers the college man."

F. P. Roesch (Southern): There has been inaugurated in the Spencer shops of the Southern during the past few months a system practically on the same lines as laid down by Mr. Cross. With some of the boys it is necessary to commence at the beginning, to teach them the A B C's. From that on they are taught drawing, arithmetic, some of the elements of geometry, although not in a regular way; they are taught the strength of materials, and what is the minimum cutting speed of the different steel and tools. The maximum cutting speeds we allow them to determine for themselves, and we find they are doing pretty well at that.

Mr. Waitt: In view of the evident interest taken in this subject and the importance that seems to be given to it, I move that it be placed in the hands of a competent committee to consider the developments and advancements in the apprenticeship system of education during the coming year and to report upon that, and also

to consider the advisability of continuing or substituting something more up to date for our present recommended practice that is printed from year to year in our reports.

Motion carried.

Spacing of Flues in High-Pressure Boilers.—Following the presentation of this report John Tonge (M. & St. L.), one of the committee, presented some supplemental information regarding the flue spacing and arrangement on his road with the savings in costs of material and labor effected thereby.

F. F. Gaines (C. of Ga.): At a previous meeting of the association attention was called to increasing the bridge spacing by using a much decreased end on a standard flue to accomplish practically the same object of the greater spacing of the flues—that is, to get a larger area around the flue at the bridge sheet. It seems to me this is the principal thing to be gained in the larger spacing of the flues, to get more room at the bridge.

G. W. West (N. Y., O. & W.): We have been following that practice for a number of years, putting 1¾-in. safe-ends on 2-in. flues and 2-in. safe-ends on 2¼-in. flues, and we have materially reduced our flue troubles and get better steaming engines, and our flue-sheets are almost doubling the extent of their lives.

Mention was made of the fact that the alleged advantages of wider spacing of flues had been known for several years, yet the practice in that regard has not changed materially.

F. H. Clark (C., B. & Q.): This question of flue spacing has to be considered in connection with several other matters—the water, the steaming qualities of the boiler and circulation generally. A number of years ago we changed an engine which previously had ⅝-in. bridges, and we increased the bridges. I do not know whether we did it by putting in a new flue-sheet and a number of smaller tubes, or used the same size tubes and a lesser number. At any rate, the result was to make a very poor steaming engine; the engine was not a good steamer in the first place. By increasing the spacing of the flues we had got below the necessary heating surface for that particular engine. Since that time we have increased the width of our bridges somewhat, though not much, probably 1/16-in., and we find that to be pretty satisfactory for almost any size of boiler, provided we have a good circulation outside of the flues and plenty of room between the flues and the shell. It does not seem to matter much what the spacing is so long as you get good circulation.

H. H. Vaughan (C. P.): There is no doubt that a bridge of 13/16 or ⅞-in., or even larger, has proved advantageous in bad-water districts. Sometimes we make a mistake in bad-water districts by heavy prossering after increasing our bridge. That will certainly allow the scale to accumulate around the bead formed on the inside of the bridge that almost neutralizes the effect of the larger bridges. We have obtained good results in bad-water districts by doing away with the prossering altogether, so as to leave as clear a chance as possible for the water to circulate and to prevent stale water from accumulating as much as possible.

Mr. Tonge's argument seems to be based very largely on the saving in the cost of renewing flues. I do not agree that it would be a good thing to have a smaller number of flues because it costs less to safe-end them. It is fairly safe to assume that the larger the number of flues you can get into a boiler without affecting the circulation and without getting them placed so close to the flanges that we have no room there for flexibility, the better. The general principle in designing an engine is to take a certain weight and try to get in as much heating surface as possible, and I believe that is the right principle. If we are going to reduce our heating surface 5 to 10 per cent., we may not by any test be able to distinguish any difference in the economy of the engine, but I feel that the decreased economy is there. You cannot cut down the heating surface 10 per cent. on an engine and expect to evaporate as much water right along as you would do with a larger amount of heating surface, and the loss in evaporation will certainly more than counterbalance the cost of replacing flues. In other words, I believe that until we get so many flues that we are getting more than the boiler can take care of comfortably, it is a good thing to have them. I would not cut out flues to save the cost of safe-ending them.

A motion was made by W. Forsyth to appoint a committee to ascertain in the most economical spacing of tubes in locomotive boilers and the relative value of the heating surface of tubes of different lengths; that the committee arrange to have experiments made at Purdue University, and that a fund be provided for the expense of a special experimental boiler for the purpose, the action being subject to the approval of the executive committee. After considerable discussion the motion was lost, the majority of the members seeming to think that if any tests were to be made they should be service tests. On final motion the report was received and the committee continued for another year.

Shop Cost Systems and the Effect of Shop Schedules upon Output and Cost of Locomotive Repairs.—This individual paper by A. Lovell, of the Santa Fe, was presented by Harrington Emerson in the author's absence.

H. H. Vaughan (C. P.): It appears to me that Mr. Lovell has described a system of shop costs that is one of the neatest and most complete arrangements that has ever been brought out in the direction of keeping track of men's efficiency. He has supplied the key to make operation-cost systems practical and useful by taking the standard time or cost on each job and compiling the figures for each man each month and then for all the men each month, and thus giving a system which probably is equal to any piece-work system we could devise. In a good many of our smaller shops piece-work systems are difficult. The work comes along in such a way that it does not allow of piece-work systems being satisfactorily introduced, and those shops are being judged very largely on their output of general repairs, or output of intermediate repairs, and we have no way of judging of them. When I was on the Lake Shore we were asked, as a committee of the New York Central Lines, to get up some system of comparing the output of different shops. We were immediately struck with the difficulty that always has been experienced in that connection, that a man could always get increased output by neglecting his repairs. A man can do repairs much cheaper than the other fellow if he does not do them as well. Mr. Lovell's system compares these things, unit by unit, and groups them together to form a completed engine, so that if one man does an engine for 110 per cent. and another for 90 per cent., you have a direct measure of the efficiency of those two jobs, based really on what would be equivalent to piece-work prices for each little job done. We have never before had a system brought before this association that would enable you to do a thing of that sort. We have never had a system for keeping track of each man's efficiency, or each gang's efficiency, in the way that this system does. I think this is one of the most remarkable papers that we have ever had, in that sense.

Results of Use of Different Valve Gears.—Discussion of this report consisted of testimony from different members concerning the satisfactory results given by the Walschaert valve gear with both slide and piston valves and its advantages over the Stephenson gear. No one seemed to have any complaints to register, either from the operating or maintenance standpoints.

Blanks for Reporting Work on Engines Undergoing Repairs.—The report was presented by E. W. Pratt, of the committee.

F. F. Gaines (C. of Ga.): There is one thing the report does not fully cover. It is very important at times to be able to give your operating officials a statement of how many engines you have available for service and how many engines you have in the shop daily. That could be handled in two ways: Where the conditions permit you can have the report made out and forward it to the train service department every evening, and the information contained in the report can be tabulated at headquarters every morning. In other cases it may be necessary to have a telegraphic report to cover this point, and, generally speaking, it will be found that it is very desirable to find what engines have been shopped daily, those turned out and those put into the shop, for light repairs, and also a statement of those engines which are undergoing heavy repairs, so that the operating department can get some sort of concise statement showing just where it stands each day. Of course, this information will be equally of value to the shop department.

H. Emerson: The paper outlines admirable records of what is going on in the shop, but it does not seem to me to be worth anything at all in determining the policy of what is impending with reference to railroad affairs. In looking over the repairs of a large railroad company we found that certain divisions would suddenly go all to pieces; they would apparently be in first-class condition, and inside of 30 days there was no motive power available, all the engines virtually being in the shop. A method was therefore devised that took the matter very largely out of the hands of the operating officials, as far as information was concerned. Every single engine was put on an efficiency basis, in the same way that the men were put on an efficiency basis. The average of all the engines in the division had to average 100. If they did not average 100, it was evident that the engines were dropping backward, and we would find ourselves in a hole. If, on the other hand, the engines averaged more than 100 on the monthly record, we knew the conditions as to that division were satisfactory. In connection with that the tonnage by months for a series of years was plotted in connection with each division, so that it was possible to say, without asking anybody whatever, in a general way exactly the period of the year when all the engines on any particular division would be required for very heavy service, and also the particular time of the year when it would be convenient to shop more engines from a particular division than at some other period.

Working along these lines it has been possible to plot the efficiency of the engines at any moment whatever, the efficiency of all the engines on the division, and plan months ahead as to just exactly how many engines should go into the shop and to tell the master mechanic three or four months ahead: "You must put so many engines into the shop next August, because if you do not put them in in August you will be in trouble in September or October," and that has introduced an entirely different method from the one with which I was formerly acquainted, for shopping and looking after engines.

On motion the committee was continued for another year and

asked to investigate what is being done along the lines touched upon by Mr. Emerson.

Development of Motor Cars for Light Passenger Service.—In presenting the report, H. F. Ball, chairman of the committee, said that since its preparation information had been received about the Kobusch-Wagenhals design of steam car, which he briefly gave. The first of these cars to be built was described in the *Railroad Gazette* of October 5, 1906.

William Forsyth mentioned a paper presented at the recent meeting of the American Society of Mechanical Engineers which illustrated quite a number of the foreign boilers for such cars.

There was no discussion of the committee report.

Causes of Leaks in Locomotive Boiler Tubes.—This individual paper was presented by its author, M. E. Wells (W. & L. E.), who discussed it quite at length. Among other things he said: One of the things in this paper that I want to bring out is the fact that the deterioration of the bottom tubes and the sides of the firebox is not caused by the fact that the sheet becomes hotter there than in any other place in the boiler, but on account of varying conditions in the water space, because the evaporation around the firebox is much higher than at the front end the demand for water at the firebox is much stronger and the circulation is toward the firebox when the boiler is in operation. The feed-water, therefore, goes to the bottom and back. I had an idea for a while that the cold water should settle uniformly throughout the whole length of the boiler, but it occurred to me that the mere fact of the deepening of the water-leg had a tendency to draw the water backward, whether the boiler was in operation or not. This colder water, causing the contraction of the tube in the space directly on the inside of the sheet, I feel, has quite an action to upset and make smaller the portion of the tube set in the tube plate, which has a tendency to be kept at a higher temperature on account of the fire. You may say that the reason I was led to take this view of the effects of the water is because we do not have the trouble in the top. You say there is more incrustation in the bottom; that when the engine comes out, for the first two or three months the leak is at the bottom the same as it is for the last six or eight months, but there is no excessive accumulation to cause what you might call overheating. The first leakage after an engine is out of the shop with new tubes is in the bottom, just the same as it always has and always will be, apparently. That is why I say that you cannot attribute this to the formation of scale. I am willing to admit after the boiler becomes old there is a formation of scale which helps possibly to make the trouble worse.

Cold air is a cause which has always been talked about more than any one cause, but I cannot see where there can be very much expected from cold air. I sent out to the larger railroads a list of questions in order to get some information bearing on this subject. One of the questions I asked was: Can cold air entering the firebox cool the tubes and plates below the temperature of the water on the other side? The majority of the men answering that question said no. There seems to be no other answer. You know that the influence of water on the inside of a boiler will keep the sheet that is adjacent to it up to within a degree or two of the temperature of that water, in spite of any ordinary air condition. It is an easy matter with the injector to cool the temperature of the boiler 100 deg., and cold air could not possibly cool it 5 deg. below the water temperature on the other side, but when you cool the water side, then you are doing some cooling that gets right to the point. It is the internal conditions in the boiler which cause the trouble. The best way to rectify that is with your crew; they can do a great deal. It is naturally a little trouble sometimes to fix your injectors conveniently and do away with the screw throttles and give your men lever throttles wherever you can; but the most important line to work along is to devise something to do that automatically. The London & South Western Railway, of England, sent me a most encouraging report along that line, and I believe their system was developed entirely independently of anything that was being done in the United States. On the London & South Western, where an engine comes in that needs injectors removed, they are taken off and they put on little duplex pumps located at the head of the firebox under the bell of the boiler. Mr. Drummond, of the London & South Western, says: "We start the pumps when we start the engine, and we shut off the pumps when we shut off the engine, and we maintain a uniform boiler feed. Our allowable variation in the water glass is ½ in." It seems almost impossible to think you could get your engineers to do that. Just get them to do that well with your injectors and much of the difficulty will be removed. There is quite an erroneous idea as regards the temperature of sheets and fireboxes. The temperature of the fire in the firebox ranges not far from 2,000 to 2,400 deg. The Pennsylvania tests at St. Louis gave 2,300 to 2,400 deg. The temperature of the water, with 200 lbs. of steam, is 388 deg. The sheet ordinarily is seldom higher than 75 deg. above that. The difference on the two sides of the sheet, according to some tests referred to in the paper, is not very great; the transmission of heat through a ⅜-in. sheet is so rapid that the difference in temperature between the two sides of the sheet is not very great, and there can be very little trouble from this heat, because the sheet in a firebox that evaporates the most water and gives you the most steam gives you the least trouble—the crown-sheet. If a boiler sheet does reach the point of burning, either from scale or from other cause, you know about it.

In answering the set of questions I sent out, Mr. Lewis, of the Norfolk & Western, says that 30 or 40 per cent., nearly half of their leaking engines, come in dry and leak over the clinker pit, largely on account of filling them up to save the boiler-washer's job. In answer to the question, "Have you made any changes in the introduction of feed-water into the boilers on this account," he said: "The effect of feed-water entering the boiler and starting the flues to leaking is more noticeable when the water is injected into the side of the boiler. To overcome this feature we have on several of our boilers constructed an auxiliary dome, which is located between the front of the boiler and the sand dome. This dome is filled with short sections of tubes, and the water is injected into it and among these tubes, so that by the time it has reached the bottom it is so nearly the temperature of the surrounding water that the difference in temperature is not so great as to cause such evil effects as where the water is injected low on the side of the boiler. The most important change in this connection was the application of a reinforced flue sheet, which consists of an auxiliary sheet placed 8 in. ahead of the back flue-sheet. This sheet is secured at regular intervals to the back flue-sheet by means of a series of stay-bolts. The auxiliary sheet has no other connection with the boiler, thus allowing it perfect freedom of adjustment in connection with the expansion and contraction of the flues and flue-sheet. The water has free access to this place on both sides. We believe with this auxiliary sheet a greater circulation of water at the flue-sheet proper is obtained, thereby keeping the flue-sheet at a more uniform temperature and also carrying away such sediment as is likely to adhere to the flue-sheet and result in scale."

F. P. Roesch (Southern): I cannot agree with Mr. Wells on the temperature of the water in the boiler being the cause of flue trouble. I draw my conclusions as much from practical experience as from practical tests. I have been located in countries with good water and bad water. I remember one particular instance in a bad-water country of a helper engine on a hill. The engine never entered the terminal to be washed out, or to have the fire cleaned, or anything like that; in fact, the fire was in the engine continually for months. Strange to say, while the particular water that this engine took was the worst water on the road, and while other engines passing through took the same water, and leaked, this engine did not. When business picked up, more engines were placed at this particular point, and they did not leak.

The question of flue leakage is exactly in ratio to the number of times the fire is knocked and the boiler is washed out. In a district I know of where the engine is washed every round trip, and consequently the fire is knocked, the life of flues is about three months. And in another district where the engine was washed every week and the fire was knocked only once a week, the same flues last six months longer. In a third district, where the engine is run for 15 or 30 days without a washing, and during that time the fire was not knocked except, possibly, to repair grates or something like that, the same flues last another nine months longer. On another road, up in the mountains, the fires are never knocked and flues last so long that we lose all record of them—20 years—never wash the boilers, never bother with them.

A year ago I had occasion to make a test to see if cold air did actually have any effect on flues. We took an ordinary wide firebox locomotive with 385 flues and put her over the cinder pit and knocked the fire. Preliminary to this test we opened up the front end and cleaned off one certain flue, perfectly clean and smooth. We made a long arm of wood with a micrometer attachment on the rear end of it. After the fire was knocked the engine still had 135 lbs. pressure, or 385 deg. of heat, and the length of that one particular flue was taken right in the center of the box, and at the same time the corresponding length was inscribed on the side of the boiler. After the engine stood quiet for 3 hours and 50 minutes without any water being injected into the boiler at all the pressure was dropped down to 56 lbs., or 305 deg. The boiler had contracted just an even $^{1}/_{16}$-in. in the length corresponding to the length of the flue, and this particular flue we took the length off had contracted $^{3}/_{32}$-in., showing that the flue through the action of the air through it had contracted more than the boiler itself. After the engine stood 2 hours and 30 minutes longer the pressure was down to 6 lbs., or 233 deg. of temperature. The boiler had contracted $^{14}/_{64}$-in., while the flue had contracted but $^{9}/_{64}$-in., showing that owing to the difference in the amount of metal in the boiler and flues, the final contraction of the boiler was greater than that of the flues, and produced a pushing and pulling action. Several other engines were tried with like results.

W. E. Symons: It is customary on some foreign and a few American roads, when an engine arrives at a terminal, to place a cap or lid over the smokestack. On many English roads there is a plate affixed to the stack on a hinge that is laid over the top of the smokestack to prevent air currents through the firebox and flues

in order to avoid the very difficulties that have been pointed out to us as coming from a change in temperature from feed-water. Therefore, it is very plain that the air temperature is very injurious and responsible for a great many of our boiler troubles.

A motion was adopted that further discussion be in written form and be forwarded to the secretary for incorporation into the Proceedings, subject to answer by the author of the paper before printing.

Superheating.—The report was presented by H. H. Vaughan, chairman of the committee, who said: Since writing the report I have come to the conclusion, from some facts we have learned about overheating of return bends, that the neglect of dampers has a good deal to do with the stopping up on the pipes. I do not believe the cinders will attach themselves to a cool return bend, and they do attach themselves very readily to a very hot one. * * There is a drop of pressure of from 5 to 7 lbs. under ordinary working conditions in the steam passing through the superheater. That makes the sight-feed lubricator a better lubricator on a superheater than it is on a saturated steam engine. As a matter of fact, on account of our always having 7 lbs. or more difference between the boiler and steam chest in the superheater than in the ordinary simple engine, the sight-feed lubricator worked just that much better instead of worse, and there is less trouble with it than there is on the ordinary engine. * * * Superheating came to this country with no experience except the European practice, and what does for European practice will not always do for us. That may be illustrated by a thing we have had driven on to us, and that is, that whatever superheater you use you have to use one that can be fixed up in an hour or two and the engine put back into business. * * * Several roads in the United States have tried a superheater that has given trouble, and they have said, to a certain extent, that the superheater would not do, that it gave too much trouble. Now, if the superheater can be properly handled it will not give too much trouble. I believe inside of another year's experience we can say definitely and reliably that you can equip your engines with superheaters, and if you will give them attention—not expense but attention—you can run without any more trouble than you have with the ordinary simple engine. I would like to emphasize the difference between attention and expense. If we are going to give up a device that will save from 10 to 20 per cent. on coal just because we cannot get roundhouse machinists and foremen to pay attention to things, we are going on the wrong track. It is a question of attention with your superheaters, and not of expense. We have the records from passenger service of the number of failures, and of these failures a large number came from the use of bronze nuts. There are only three failures that are serious in 198,000 miles. That shows definitely that you do not have enough engine failures with superheaters to condemn them. Our repair costs show that we do not have enough additional cost of repairs to condemn them. The road records show that they do make a satisfactory saving in coal. Therefore, I think this superheating is a thing that is worthy of careful attention and should be taken up properly.

We frequently hear it stated that coal costs only $1.50 or so, and it is hardly worth while to superheat, almost always forgetting that coal costs $1.50 originally may not cost that where it is burned. It costs money to haul coal to the place where it is burned. There are many roads showing coal at $1.50 on the performance sheets that are hauling it three and four hundred miles before it is used. You cannot haul it much under one-half a cent per ton mile, and that runs up fast, and there are few roads that cannot afford to spend $800 or $1,000 on a new engine to save that.

A. W. Gibbs (P. R. R.): Do the German recommendations for the sizes of piston valves hold out in our practice? One German engineer mentioned exceedingly small piston valves of special construction to prevent warping. Will they hold out, or do we have to use valves as large as with saturated steam, and do we have to use forced lubrication?

Mr. Vaughan: We have been using superheated steam in an ordinary engine of the regular design, but we have used rather smaller piston valves than most people. We use a 11-in. piston valve for a 21-in. cylinder, and we have since enlarged that cylinder to 22½ in. and still use the 11-in. valve, with results entirely satisfactory. I feel, though, that we have gone about as far as is necessary in putting an 11-in. valve on a 22½-in. cylinder. Of course, that is a considerably smaller valve than you would use in general practice with saturated steam. Forced lubrication I do not believe to be necessary at all. I think the sight-feed lubricator, as I said, works better on a superheated engine than on a saturated engine.

Blank Form to Give the History of Locomotive Movements at Terminals.—The report was presented, and the use of the blanks explained, by G. M. Basford, chairman of the committee.

P. H. Peck (C. & W. I.): This system may be all right where one road only has a terminal. I have the engines of five roads at our terminal and we are handling about 100 engines a day. We report the engines to the roads when they are ready for use. Sometimes they want more engines than we have at the terminal, and we have to call for a relay of engines to be delivered from outside the terminal. If we undertook to follow out the blank as presented by the committee, it would entail upon us an endless amount of work. In our case we merely report the movement of engines which we have ready for service.

F. H. Clark (C. B. &.Q.): We use a similar report, and have had it in service for a couple of years. We have found it very serviceable at times in locating delays to power. You might probably get into a position where quick turning was necessary, and in a case of that sort I think this blank has a great many advantages.

G. M. Basford: The blank is not intended or recommended by the committee for continuous use. It is intended for use at times when power is very greatly needed, and when its use will save time.

L. G. Parish (L. S. & M. S.): We have a blank for similar use and it has given good results. We feel from our experience that it would pay us to continue its use throughout the year.

H. H. Vaughan (C. P.): I ask whether "mechanical delay" means the time the engine is received on the ashpit until it is ready, including all the time the engine is at the roundhouse?

Mr. Basford: The committee had not that idea in mind. The time the locomotive is in a terminal may be divided into two parts: necessary time and unnecessary time. The committee expected this column to include explanations or excuses, or whatever may be necessary under the circumstances to cover the differences between the time promised and the time ready, to indicate unexpected delays, or any delays that should not have occurred. It is not the intention of the committee to suggest this "mechanical delay" as covering all the time at the terminal by any means; a certain time is necessary, but only that time or delay which is created by mismanagement or accident.

Mr. Vaughan: I do not agree with the committee. These blanks would be used as telegraph blanks are used—only at busy times. Our regular blank is handled all the time, because we are getting our accounting department, which makes up the mileage statement by divisions from the superintendent's reports, to try to give us figures showing the time each engine was in the house and the average miles per hour which the engine makes between the time it leaves the house and the time it comes back to it. Some of the miles per hour do not amount to much and can be improved. If you can get a figure-level throughout the year and showing the miles per hour you work through-freight engines, you will find some great differences between different divisions. We, like a lot of other roads, always had reports from the mechanical department showing whether an engine was delayed on account of the mechanical department or on account of the traffic department. We used to get reports showing that eight or nine engines were ready and were not called for, and then, of course, we would write to the superintendent and tell him that he was not handling the trains right, that there were so many engines ready which were not being used, and that the roundhouse was ahead of him. As a matter of fact, in busy times the yardmaster can go in and give the roundhouse a bunch of orders which will keep it going for a week, and there is no defense possible on the part of the roundhouse. The only way to do is to take the total time at the terminal, and charge it up to the mechanical department, not worry as to who is responsible for it, simply saying we are losing five or six hours, say, as an average, at a terminal, and if we get up to an average of eight hours, we had better look into it. I think the mechanical delay should be computed from the time the engine is received at the yard until it is ready for the train, because when there is a transportation delay, at that time you do not need the power. When you do need the power, there are no transportation delays unless it is due to the roundhouse foreman's way of figuring with the yard. It is all mechanical. They will take the locomotives generally as fast as you can give them. If we should use this blank, I would like to make the mechanical delay to represent the time during which the engine is at the roundhouse until it is ready at the terminal and base the number of hours on the average of that.

Other members spoke of blanks of similar character to the one proposed by the committee which were in use on their roads with advantageous results, some using them continuously, and others when conditions required. No action on the report was taken by the convention.

Locomotive Failures, Records and Results of Keeping Them.—This paper was prepared by W. E. Dunham (C. & N. W.).

T. E. Adams (St. L. S. W.): During the discussion on apprentices, the question was asked, "What is to be done with our firemen?" I include in that our engineers, master mechanics, superintendents of motive power, general superintendents and general managers, on the question of coaling. There is not in Germany, France or the United States, at Purdue University or Cornell University, any course of instruction designed to impart knowledge as to the intelligent use of fuel. The railroads of the country have been trying for the past ten years to instruct their firemen in the intelligent use of fuel. A technical student could be educated thoroughly on the use of fuel, and if knowledge in that branch of engineering was imparted to him he would be a credit to himself and the company by which he is employed. On a large railroad failures of engines are one of the greatest drawbacks in the practical

operation of the road. For a number of years I was locomotive engineer, and I always felt if I had a good fireman I was a good engineer, and that if I had a poor fireman I was a poor engineer. It did not make any difference what the quality of the fuel was, the success of the engine steaming depended entirely on the fireman. A good engineer certainly ought to know how to instruct his fireman in the use of fuel when he does not know how to use it properly. The fuel question is one of the most important things for a motive power officer to understand in the conduct of his business. What is there to learn? First, that when slack coal is put on a tender, it is not necessarily an inferior quality of coal. Second, that the fireman must be taught to fire that kind of coal to avoid fires clinkering, flues honeycombing and netting in front-ends stopping up. It is possible to teach engineers how to avoid any kind of coal clinkering. There is not a shovel of coal used in the United States to-day as a fuel coal that will clinker if it is properly used. I believe that the education of enginemen and all concerned in the use of fuel would bring about results of the greatest value in the practical operation of the railroads of this country. One of the greatest difficulties encountered in any effort to extend knowledge regarding the subject of fuel consumption is in the fact that it is difficult in the case of the old engineers and firemen, who have been on an engine for years, to get them to understand that there is anything you can teach them. Naturally, they believe that their experience has fitted them to judge of the conditions of fuel economies from a practical standpoint. The greatest hope that we have of making satisfactory progress in the direction of securing a proper handling of fuel, and thereby bringing about fuel economies, is in teaching the young firemen and engineers.

A. E. Manchester (C., M. & St. P.): Referring to the first blank presented, I do not think it provides quick enough action. I like a form of blank which reads: "An engine failure from any cause must be reported to the train despatcher by the engineer at the first point where the train makes a stop." This report must then be transmitted to the roundhouse foreman, and if it be an engine delay or failure, state that in this way: "No. — Due to arrive at ——. Had an engine failure due to ——." This puts the roundhouse foreman in touch in advance with what he may expect to have to meet when that engine arrives. After the engine arrives and the proper inspection has been made to determine what is the cause of the failure, and what action will have to be taken to remedy it, it then devolves upon the roundhouse foreman to advise the train despatcher that engine No. — will be repaired and ready for service at such a time.

The second blank I do not like because it is too slow of action. I like a blank in which the train despatcher, or the superintendent, or the master mechanic, or the master car builder of the district, reports at the end of each 24 hours, showing that there have been certain engine failures, from such a cause, or car failures from such a cause occurring on the division during the last 24 hours. That is the method we pursue. Once each week the master mechanic or the master car builder makes a resume of all the delays that have occurred in his district, and furnishes them to the general master mechanic or the superintendent of motive power, somewhat on the lines as laid down on the blank, as shown.

E. A. Miller (N. Y., C. & St. L.): About two years ago we adopted a blank by which the engineer reports directly to the superintendent of motive power at the end of his trip on a special blank any failures he may have had, and the cause of that failure. From those blanks we make up a statement monthly giving the 87 items of failure, and miscellaneous conditions claimed to cover others. By this method we have reduced our engine failures more than 50 per cent. in about six months. Also, on account of engines running first in and first out, we make a record of the failure of each man. We do not publish that, although we did for a considerable time publish it, and it was wonderful what a change it made in regard to engine failures. The men did not have a failure if they could help it. However, in deference to the request of the engineers, we discontinued publishing the list of the engineers who had failures during the month, but kept this list carefully compiled for our own satisfaction. We found that in many cases we were able to take up with the master mechanics quickly the subject of certain failures, and were able to remedy the evils that were likely to become epidemic; that is, we kept our hand directly on the engine conditions of the road. We recently made 13,578 miles between engine failures on an average of about 75 locomotives that were in service on our eastern division.

Subjects: The Secretary presented the report of the committee on subjects. The suggestions were referred to the executive committee to consider for next year.

The officers elected for the coming year were: President, William McIntosh (C. R. R. of N. J.); 1st Vice-President, H. H. Vaughan (Canadian Pacific); 2d Vice-President, George W. Wildin (Lehigh Valley); 3d Vice-President, F. H. Clark (C., B. & Q). Members of the Executive Committee, C. A. Seley (C., R. I. & P.); F. M. Whyte (New York Central Lines); John Howard (New York Central), to serve two years, and A. E. Mitchell (N. Y., N. H. & H.), to serve one year.

Topical Discussions.

IS IT DESIRABLE TO ELIMINATE WATER-GAGE GLASSES ON LOCOMOTIVES TO ENFORCE THE USE OF GAGE-COCKS?

F. F. Gaines (C. of Ga.): The wording of this subject is such as to presuppose the superiority of the water glass over the gage-cock, and from a personal standpoint I entirely agree with that supposition. We have, however, to consider the effect of eliminating the water glass from two standpoints. I might say the first will be decided from what might be termed a legal standpoint, and the second by the effect on operating. Suppose an accident due to low water occurs on some railroad on which the water glass has been removed. What effect is it going to have on a jury to remove an admitted safety appliance? The road I am now connected with I found equipped both with gage-cocks and water glasses. Recently one of our engineers lost an eye through the breaking of a water glass at a terminal while waiting to go out on a train. I looked into the whole matter of the desirability of doing away entirely with the water glasses. I found that probably about 50 per cent. of our engineers depended either entirely on the gage-cocks or were sufficiently familiar with their use to handle their engine, and that of the other 50 per cent., some of them knew a little about using gage-cocks, but the majority of them depended entirely on the water glass. Under that condition of affairs I decided at the time to let the matter stand and not make any change. I think, however, there is a desirability of doing away with this, but that we ought to have something back of it to justify us in doing it. My idea is that the matter should be very fully discussed and later put to a vote of the association as a recommended practice.

A. W. Gibbs (P. R. R.): I think with Mr. Gaines that the water-glass is unsatisfactory because of the liability to breaks, but I am not yet ready to take it off. Most men are not skilled enough to see whether the thing is moving, so that the indication of a full glass is an indication of a full boiler, which in many cases is not the fact. In New York State I believe there has recently been a law passed enforcing the use of the water glass. My observation of boilers has been that the gage-cock alone, where you are obliged to use it because you have nothing else, is the more reliable appliance.

E. A. Miller (N. Y. C. & St. L.): Some months ago we developed an epidemic of broken pistons, caused, as we believed, by men working water through their cylinders, or rather, carrying their water too high in the boilers on the class of heavy compound engines that we had, and which all of our men, especially the younger men, were not familiar with handling. We got out of that trouble by changing the shield that covers the gage glass; that is, taking the space from the center of the lowest to the center of the highest gage-cock as 5 in., we found that the water glasses were 8 in., and that the variation of three additional inches in the space that the water could be carried in the boiler just made the water level in the boiler high enough to give us the trouble. We changed our shields to 5 in., so that 5 in. of the water glass would show instead of 8 in., and immediately our trouble with broken pistons ceased.

D. Brown (D., L. & W.): If you put the glass frame upside down from what it is at the present time, that is, instead of blowing the water out and having the steam follow down through, let the water go up, it will never go out of the glass. There will be water all the time. You can clean the glass better, scour it, and it is in better condition to observe the water. Furthermore, the temperature, in my judgment, is kept better in that way by the hot water being in it the whole time. You have not got to change from steam to water. Besides, any scale that would lodge on the glass otherwise is not allowed to do so. It passes off in solution, whereas with the steam passing down through it it dries and a certain portion adheres to the glass. I recently saw a glass that was taken from an engine scaled on the inside so that you couldn't see the water, and to all appearances it looked as if he had been painted with aluminum.

RELATIVE MERITS OF OUTSIDE AND INSIDE DELIVERY PIPES FOR LOCOMOTIVE INJECTORS.

Strickland L. Kneass: The main check has been applied to the back head of English and continental engines for many years, and this may be regarded as the standard location in the British Isles. The construction of the English locomotive boiler and cab yields readily to this arrangement, but there are other reasons. The chief objection against projecting side checks is that of danger to passengers, as serious accidents have occurred from the shearing of the boiler check by the overturning of the locomotive or the derailment of a passing train. The matter of safety has been partially met by an internal side check, but it is doubtful if this form is entirely satisfactory, as it is difficult to keep steam-tight, and impossible to examine or regrind without relieving the boiler pressure. The extreme length of the branch pipe on large locomotives is also a disadvantage on account of the cost of bending, the present high price of copper, and because of the weakening of the section at the bends. It is difficult to bend pipe and maintain a circular section. The cross section is almost always elliptical or the mate-

rial strained. The result is creeping of the pipe and occasional bursting when subject to excessive back pressure. I have taken indicator diagrams of the pressure in the branch pipe while starting and stopping an injector, rotating the drum by the stroke of the starting lever. An analysis of the diagram is of interest. With careful handling, the pressure rises gradually from zero to boiler pressure; quick, careless starting of the feed causes an overpressure double that carried on the boiler, which may weaken or burst the branch pipe. Creeping due to flattened bends causes undue strain on the boiler check and the pipe joints; the writer has noticed one instance where a main check was unscrewed one-eighth turn by the warping of the branch pipe; in this case the difficulty was corrected by using a check with a side instead of a bottom inlet.

The location of the boiler check on the back head, with internal feed pipe delivery at the forward end, gives short direct and protected valves and pipe connections. It usually offers a convenient location for the two injectors, placing the operating levers directly beside the engineer and fireman, and out of the way of the reverse lever and throttle. The engineer then has his air-brake and feed valves close beside him; this enables him to feed the boiler to the best advantage with the least possible trouble to himself. If an engineer has to rise from his seat and reach a considerable height to apply or adjust his injector the feed will be intermittent, without the careful adjustment required for continuous feed or to maintain a constant water level. If the sprinkler valve is connected to the feed on the left-hand backhead injector, both can be operated by the fireman while on the deck of the cab.

The outlet of the back head check should enter the boiler below the low water level. The delivery pipe, connecting the back head valve with the front end of the boiler, should be not more than 2 in. above the crownsheet, so that steam may not enter through opened joints. This recommendation is made, as excessive pressure has been noted in three instances in the back head valves, due to water hammer. This phenomenon, due to faulty connections, results from the fact that if the rear end of the delivering tube has an open joint within the steam space, steam is drawn in by the feed water flowing downward toward the immersed end of the delivering pipe when the injector is shut off. The steam is instantly condensed, forming a partial vacuum, which causes a backward rush of water up into the delivering pipe against the back head check. This causes a powerful water hammer. The remedy is simple. The delivering pipe should be immersed as recommended above, the conduit may be made in the shape of a trough, or the joints kept tight. When correctly attached, no water hammer has been noticed. As joints are liable to work loose it is safer to use one of the first two methods given.

The back head feed system is preferable, as it gives an opportunity for even distribution of the feed water over a larger tube area, instead of coming in direct contact with the nearest tubes and side sheets only. When the feed enters the side of the boiler, its greater density causes it to flow downward along the side sheet to the bottom of the boiler and the waterleg, where it lies dead owing to sluggish circulation. This is aggravated by intermittent feeding, as frequent changes of temperature cause an expansion and contraction of the sheets and tubes which loosen the joints and produce leaks, increasing the cost of the flue mileage. On some railroads there is applied to the shank of the side check an upward nozzle of reduced area, which forces the water above the tubes and into the steam space. This opening, however, is liable to be closed by incrustation when the water contains lime bearing salts, and adds to the back pressure against which the injector must operate, reducing the life of the tubes.

CORRUGATED TUBES FOR LOCOMOTIVE SERVICE.

G. W. West (N. Y., O. & W.): It had always seemed strange to me that locomotive tubes, no matter how well they were set in the firebox or how poorly set in the smokebox, would invariably leak at the firebox end, and when it was not considered bad practice to remove part of the set of tubes we often found two or three rows at the extreme sides and top would outlast two sets of tubes near the center. I concluded that there was a reason for this other than the excuse often given, that of expansion and contraction. The tubesheet in the firebox did not get the protection that the smokebox sheet did, and smokebox end of all tubes and the extreme top and side rows in the firebox end did not leak owing to their having sufficient amount of water to fully protect them at all times. By welding 1¾ in. safe ends 6 in. or 8 in. long on 2 in. tubes and 2 in. safe ends on 2¼ in. tubes, we increased the bridges ¼ in., thus strengthening the tubesheet, increasing the volume of water around the tubesheet where it was needed, and improving the circulation. This practice we have kept up and our engines steam better, tubes leak less and little trouble is experienced from clogging with cinders.

In 1897 the corrugated tube was first called to my attention. It was the same size throughout but I ordered a set with plain ends with one end reduced in size to fit a fluesheet we were then putting in a passenger engine. We looked for trouble with clogging but never had it. We were using at that time a very poor grade of bituminous coal and kept a gang of men at each terminal boring out tubes. This engine was run a long time before a flue auger or any other device was used to clean the flues. The corrugated tubes made double the mileage of any plain tube we had ever before used in this particular engine or any of its class. Since the tubes have been made in this country we have applied them to all classes of engines, with wide and narrow firebox, burning both bituminous and anthracite coal, often a mixture of both. The extra first cost is soon met by increased mileage and saving of labor.

Another important advantage is the elimination of hot sparks thrown from the stack. We have a passenger locomotive fitted with these tubes that is pulling eight cars up a continuous grade of 21 miles, 80 ft. to the mile, and on the darkest night, or through tunnels, you can hardly see a red-hot spark thrown from the stack. The effect of this is shown in the temperature of smokebox front. The paint on the front end of engines equipped with these tubes will outlast three paintings on engines equipped with the plain tubes.

F. P. Roesch (Southern): We have one experimental set of spiral corrugated tubes in use on the Southern which were put in last December. Up to this time we had had no trouble from flue leakage on account of the short length of time. We have had no difficulty with the tubes clogging up although we use a very fine grade of coal and have more or less trouble with it. These tubes will eliminate sparks that might otherwise escape, and might enable us to do away with a number of devices in the front end used for the prevention of sparks, thereby obtaining a better exhaust. From what we have seen so far there is something in their favor as regards flue leakage. Another locomotive of the same type which received plain tubes at the same time is now beginning to show signs of flue leakage, and it is only a question of a short time when the flues will have to be renewed. Both locomotives were in the same condition, and in the same class of service and operating under the same conditions.

WHAT IS THE BEST METAL FOR HUB LINERS FOR DRIVING AND ENGINE TRUCK WHEELS, THE BEST METHOD OF APPLYING AND THE LIMITING LATERAL HUB PLAY FOR SUCH WHEELS BEFORE REPAIRS ARE REQUIRED?

J. F. Dunn (Oregon Short Line) by letter: Our experience has been that babbitt metal is the best material to take up hub wear. We apply it to the face of the boxes by recessing the boxes, dovetailing the outer edges of the recess and drilling a few ⅞ in. holes into the face of the box. This is to dowell the babbitt and prevent it sliding or turning. We also tin the face of the boxes, heating them sufficiently to melt the tinning while pouring the babbitt. While the babbitt is not quite as durable as brass or bronze liners on the hubs of wheels, it is more economical and serves the same purpose. It also prevents any cutting or undue wearing on either the hubs of the wheels or the face of the boxes. We do not allow more than ⅝ in. lateral wear in driving boxes or ¾ in. in engine truck boxes.

E. W. Pratt (C. & N.-W.): The metal used for hub liners, to give the best satisfaction, will be somewhat dependent on lubrication, and inasmuch as a number of railroads are using grease for driving box cellars I would like to ask if any of them have demonstrated the best lubrication for the hub. We have had trouble with friction on the hub in using grease.

J. F. Walsh (C. & O.): On account of the low temperature at which babbitt melts we abandoned it some years ago and used bronze entirely for hub liners. It is practically impossible to use babbitt metal successfully with grease lubrication.

F. P. Roesch (Southern): We use grease and bronze or brass liners, pouring the metal directly on the wheel centers.

P. H. Minshull (N. Y., O. & W.): We use steel driving boxes and steel hub plates and part the boxes with babbitt. We get good results, using grease, and have no trouble with hot boxes.

Thomas Roope (C., B. & Q.): Babbitt is much the preferable metal in a sandy country. Brass is more expensive and it wears more rapidly. Babbitt should be in every case sweated on the box.

J. J. Thomas (A. C. L.): We formerly used brass liners on the hub, and they wore fairly well, but about two years ago I tried putting babbitt on the boxes instead of on the hub. In several instances where these liners were attached to the wheel hub and had worn out, we drilled the face of the box, cleaned the face and lined it with babbitt. This has given good results.

D. J. Reading (P. & L. E.): Where a babbitt hub liner is used on the side of the driving box, you do not get the same amount of wear all over the hub. The babbitt does not wear away at the same time that the end of the crown brass wears. I have seen hubs of wheels badly scored on that account. The end of the crown brass will wear a recess while the babbitt has not worn away so rapidly. While the babbitt has been satisfactory for freight engines, we found on high-speed engines, our road having many curves, that we got the best results by using a plain hub on the wheel, cast-steel or iron, and then putting a brass hub on the face of the box. I have seen good results by using a brass face on the box, recessing the wheel box and putting in a cast-iron liner.

M. D. Franey (L. S. & M. S.): The method in use on the Lake Erie & Western consists of pouring the driving box shell in the driving box proper. The shell is poured into the box and held in place by dovetails going through the upper portion of the driving box. These projections on the box, or recesses in the box, are slotted so as to form a dovetail. The interior of the box is then heated in the crown so that the lower portion, or free portion, expands about ⅜ in. A cast-iron former is used for the circular portion of the brass and the brass is buried between the box and the former. We adopted this practice on the Lake Shore, and it is our experience in pouring the brass that if the brass cools in tne box it has a tendency to draw the box together on the lower portion. Where we pressed the brass into the box it would expand the box about ⅛ in. or more. Pouring the brass of the shell into the box has the opposite effect. When the brass and box cool the free end is drawn together about $^1/_{16}$ in. It has a double advantage. With this method it is possible to pour the brass at a lower temperature than when it was poured in the sand holes, and there is not the same tendency to segregate. It holds up better and gives a better fracture and better bearing metal. In pressing the brass out it requires from 80 to 100 tons to press one of these shells out of the driving box. It is claimed that this method does not give an equal bearing surface between the brass of the shell and the box. It is our experience that it does give that bearing surface. We pour the hub liner on the box at the same time we pour the shell, making the shell and the hub liner continuous. Where we use a steel box we pour the sideliners over the shoes and wedges. We also pour liners in our eccentric straps in the same way. It gives a much better bearing than the same metal and same mixture poured in a sand mould.

Wm. McIntosh (C. of N. J.): We recess the hubs of the boxes, fit them and face them with a good quality of babbitt. We are using that facing for our fast passenger engines round curves and over hills. We use grease for lubricating in some cases, and oil in others, and we apply it in the ordinary manner. We pack our boxes about the same as usual, using Galena oil.

F. F. Gaines (Cent. of Ga.): If you pour babbitt and peen it with the ball of a hammer, going over the whole surface thoroughly from one end to the other, it will wear longer and give less trouble from getting loose. It makes it denser and adds materially to the life of the babbitt.

G. W. Wildin (Lehigh Valley): On the Erie we abandoned brass hub liners and substituted cast-iron with soft metal facing on the box. We did not depend on the grease for the lubricating between the hub and box, and used oil in all cases. On the Lehigh Valley the practice is to use brass hub liners against steel boxes, but more trouble develops. Part of that may be due to the crooked road.

Prosecution of Anthracite Coal Carriers.

In the United States Circuit Court at Philadelphia, June 12, the long-expected suit of the government against the anthracite coal carrying railroads, charging illegal monopoly, was filed. The list of defendants includes all of the roads in the anthracite field except the Pennsylvania and the New York, Ontario & Western. The petition recites that these defendants control 78 per cent. of the tonnage and 90 per cent. of the coal deposits, and that they produce 75 per cent. of the annual supply; that independent operators, although owning only 5 per cent. of the coal deposits, produce 20 per cent. of the annual supply, which would be sold in competition with the products of the monopolized mines were it not for the restraints imposed by the big companies. The complaint further specifies:

(a) That the defendant railroads agreed among themselves upon a uniform contract to be entered into by them or their coal companies with the independent operators along their respective lines under which the railroads would be able to control the sale of the independent output, and that by virtue of their control of all the means of transportation from the anthracite mines to tidewater save the lines of the Pennsylvania and the New York, Ontario and Western, the defendant railroads were able to force and practically did force the independent operators along their lines into making these contracts.

(b) That the Erie Railroad has exchanged shares of its own capital stock for a majority of the shares of the New York, Susquehanna & Western, a competing line, thereby uniting under a common source of control the two competing railroad companies and their subsidiary coal companies.

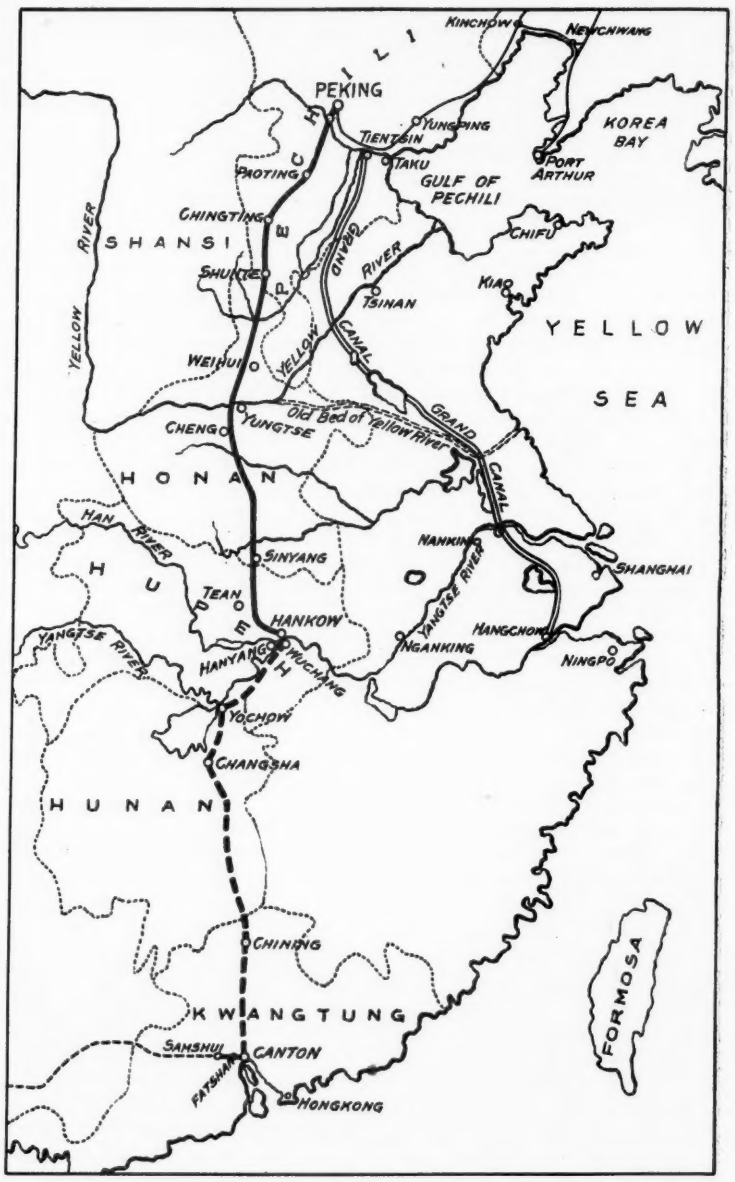
(c) That the Reading Company, which already held all the shares of the Philadelphia and Reading, has exchanged its own shares and bonds for a majority of the shares of the Central of New Jersey, a competing line, thereby uniting under a common source of control the two competing railroads, and their subsidiary coal companies, which together transport about 35 per cent. of the annual anthracite tonnage and control about 60 per cent. of the anthracite deposits.

(d) That twice in recent years the defendants have defeated the construction of projected independent railroads from the mines to tidewater, which would not only have introduced competition into the transportation of anthracite coal, but would have permitted the output of the independent operators to be sold in the markets in competition with that of the defendants.

The petition prays generally that the defendants be enjoined from further carrying out their combination, and that the above described contracts be cancelled; that the mergers between the Erie and the New York, Susquehanna and Western and their coal Companies, and between the Philadelphia and Reading and the Central of New Jersey, and their coal companies be dissolved.

The Great Interior Trunk Line of China.

"One of the first steps toward the realization of our new national ideas would be the construction, under Chinese auspices, of a great trunk line to traverse the central and most fertile provinces of China, from Peking to Canton." These are the words of the Chinese minister at Washington, and they represent one of the most definite ambitions of the awakened China. Peking, the capital of the Chinese empire, is about 100 miles inland from the gulf of Pechili, with which it is connected by railroad. Canton, the principal city of south China, is a port on the southern coast of the



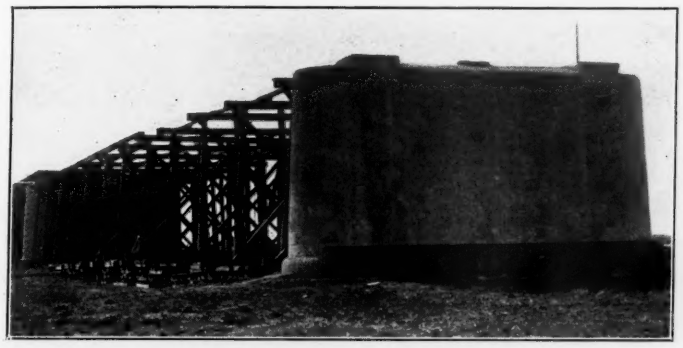
The Peking-Hankow and Canton-Hankow Railroads.

empire. It is important to China to have these two great cities connected by a railroad, not only in order to develop the populous provinces lying between them, but also for military and political purposes. China territorially is not unlike the United States except that she has no western seacoast. The natural plan of railroad development would be by east and west lines inland from the seaports such as were first built in this country. In China, however, many of the most important ports are under the control of foreign nations, who also command the sea. The Chinese fear to open up the empire to foreign attack by building east and west lines. The advantage of the north and south line from Peking to Canton is that it will make it possible to concentrate military forces

in case of need, a thing impossible without it, for military transport would not be safe by sea and the distances are too great for land marching over poor roads.

The route of this proposed interior trunk line is shown on the accompanying map. It is already in operation from Peking south to Hankow, 753 miles. From Hankow to Canton is nearly as much further. The completed section of the road was built by a Franco-Belgian syndicate under Jean Jadot, a Belgian engineer, as Chief Engineer, and was officially opened on November 12, 1905.

Since that time there has been every reason for building the remainder of the line south to Canton. The original concession for this section of the line was granted to an American citizen and by



Typical Masonry Bridge Pier.

him turned over to an American syndicate, headed by the late Senator Brice. A preliminary survey for the line was made by William Barclay Parsons in 1898 and 1899. Subsequently the American-China Development Company was organized and took over the concession. The Boxer troubles in 1900 and following events delayed the construction. After these matters had been all adjusted the company built the Samshui branch from Canton westerly through the manufacturing city of Fatshan to Samshui, 30 miles. The traffic immediately developed on this line was very large, chiefly in passengers. Most of the trains are hauled by Manhattan Elevated locomotives, which are heavy enough for the short-train, broken-service traffic. Photographs of trains on this branch were published in the *Railroad Gazette* of October 12, 1906, and January 25, 1907. The

Landing Construction Material for Peking-Hankow Railroad.

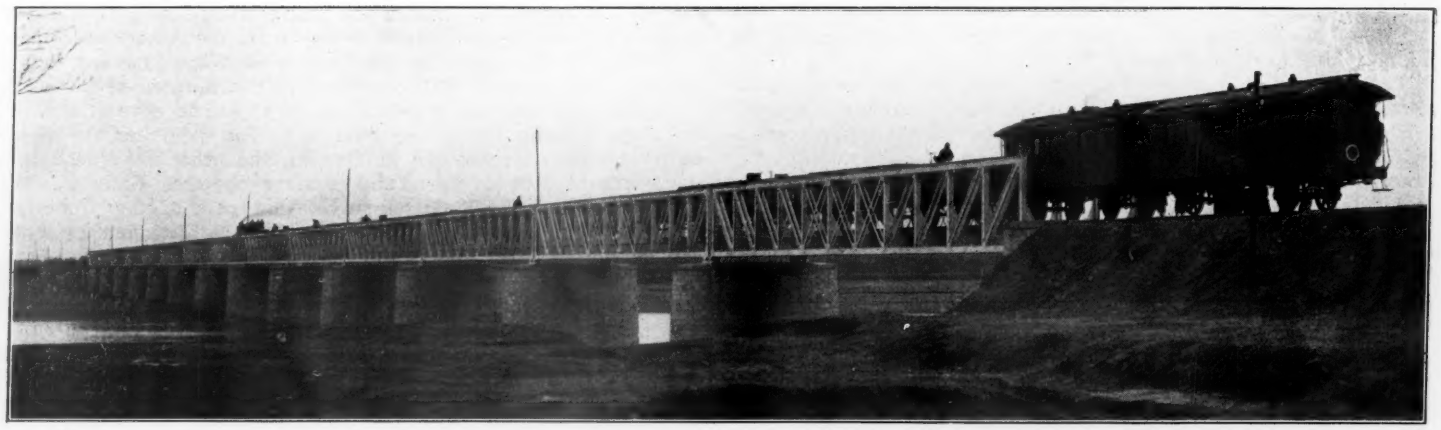
American-China Development Company also graded 12 miles of roadbed on the main line northerly from Canton to Kotung, laying track for about six miles, delivering the rails, bridge work and some of the equipment on the ground for the whole. At the close of the work P. H. Ashmead, who is now in charge at New York of the railroad work which J. G. White & Company are doing in the Philippines, was Chief Engineer.

At this point the Chinese Government intervened, stating that it was its policy not to grant any more concessions to foreign companies, but to acquire the existing concessions so far as possible, and that it therefore desired to purchase from the company all its property and rights. A loan having been made by the viceroy of one of the provinces through the Hong Kong-Shanghai Bank, the necessary funds were obtained to buy from the American company all its rights, at a price satisfactory to both the company and the Chinese Government. This was done in the autumn of 1905.

Since that time many complications appear to have arisen. The territory through which the road is to run is under the government of two viceroys, one at Canton, the other at Wuchang, on the southern side of the Yangtse river opposite Hankow. Each viceroy promptly took possession of that part of the property in his own territory. The bulk of the work which had been done was on the southern end of the line, which fell to the Canton viceroy. The viceroy of Wuchang, however, secured control of the property at the head office of the company at Shanghai. In the same way the different provinces through which the road was to run decided on different methods for building the road. In Canton (Kwangtung province) the merchant class decided to build the road themselves; in Hunan the gentry and officials agreed to co-operate with the merchants; in Hupeh the railroad was to be built by the government officials exclusively. In these last two provinces no work whatever has been done, but the people are not ignorant of the fact that they are to have a railroad, for they have to pay higher taxes in order to repay the loan made to buy the road from the American company. Thus nothing was accomplished on the northern or Hankow end of the Canton-Hankow line.

On the Canton or southern end matters have progressed further. Subscriptions were asked for building the road and shares issued in $5 denominations for $1 each. These were heavily subscribed for. Dissensions immediately began as to who should have control of the money. The viceroy appointed one set of directors; the merchants another. The viceroy thereupon arrested the directors appointed by the merchants, and was upheld in his action by the central authorities at Peking. After this trouble had blown over, it was discovered that there were no Chinese engineers competent to build the road. It was natural to turn to the Belgian engineers who had built the northern section of the trunk line, but the governor of Hongkong, a British city, intimated that it would be more graceful on China's part to appoint British engineers. At this deadlock the viceroy's appointee as President of the company resigned, accompanying his resignation with a statement that the Chinese engineers who were in charge of the work were absolutely incapable and urging that English, American or Japanese engineers be secured. The only result accomplished was the completion of the line from Canton to Kotung, 12 miles, already more than half finished by the American company. This was the progress of the enterprise up to about September, 1906.

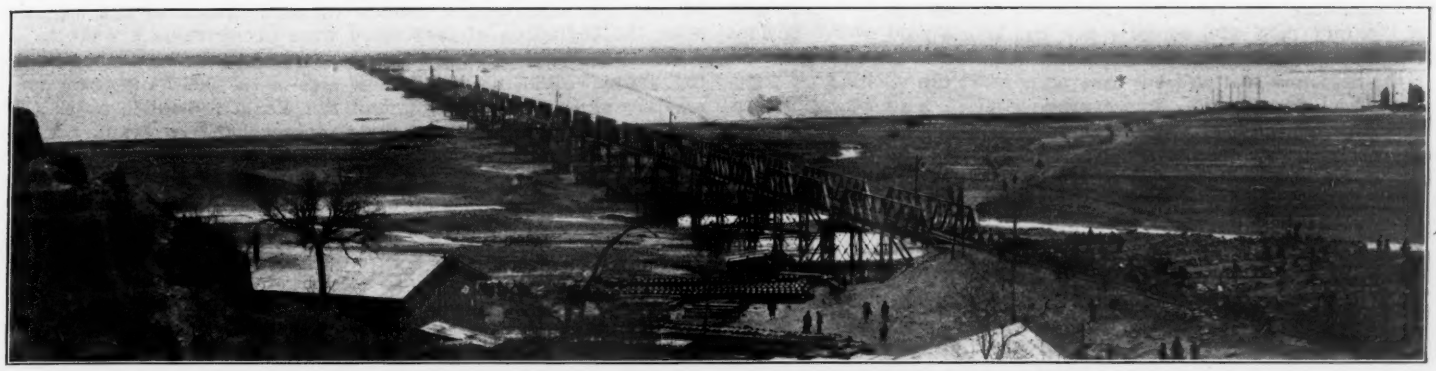
The situation since that time is summed up by the Hongkong correspondent of the *North China Daily News*. According to him the present situation is characteristically Chinese and could hardly have been created in any other nation. It is confusion worse confounded. For a foreigner, lacking the Chinese mind, it is almost impossible to apprehend clearly what is the trouble. The general situation, however, appears to be somewhat as follows: Two Chinese gentlemen of Hongkong, large shareholders in the railroad company, who had in their possession large sums of money which had been subscribed toward building the road, refused to hand over the money at the central office at Canton when called on to do so on the ground that there should first be a public audit of the money already received. Probably in consequence of the implications involved in this demand the viceroy was removed and a new viceroy appointed, who ordered that an audit be made. So far as has been announced no crookedness was discovered, but a full disclosure of the findings has never been made public. The two Hongkong gentlemen then applied to have their names reinstated as shareholders of the company. Following this there was a general meeting of shareholders at Canton which seems to have put in the shade any stirring shareholders' meeting of which the Occident has record. A certain man openly charged the Canton officials of the road with wholesale bribery of the provincial officials, naming specifically the viceroy, the provincial treasurer and the provincial judge as bribe takers. The proceedings at this meeting were supposed to have been kept secret, but modern journalistic methods having apparently found a foothold in China, a report of the meeting was published in one of the Chinese daily papers. The ink was hardly dry before the accused officials had arrested the editor, and discovered from him the author of the original accusations, who was at once thrown into prison. There he was at last accounts, the officials, according to report, being consumed by a white hot rage,



One of the Long Steel Bridges; Peking-Hankow Railroad.

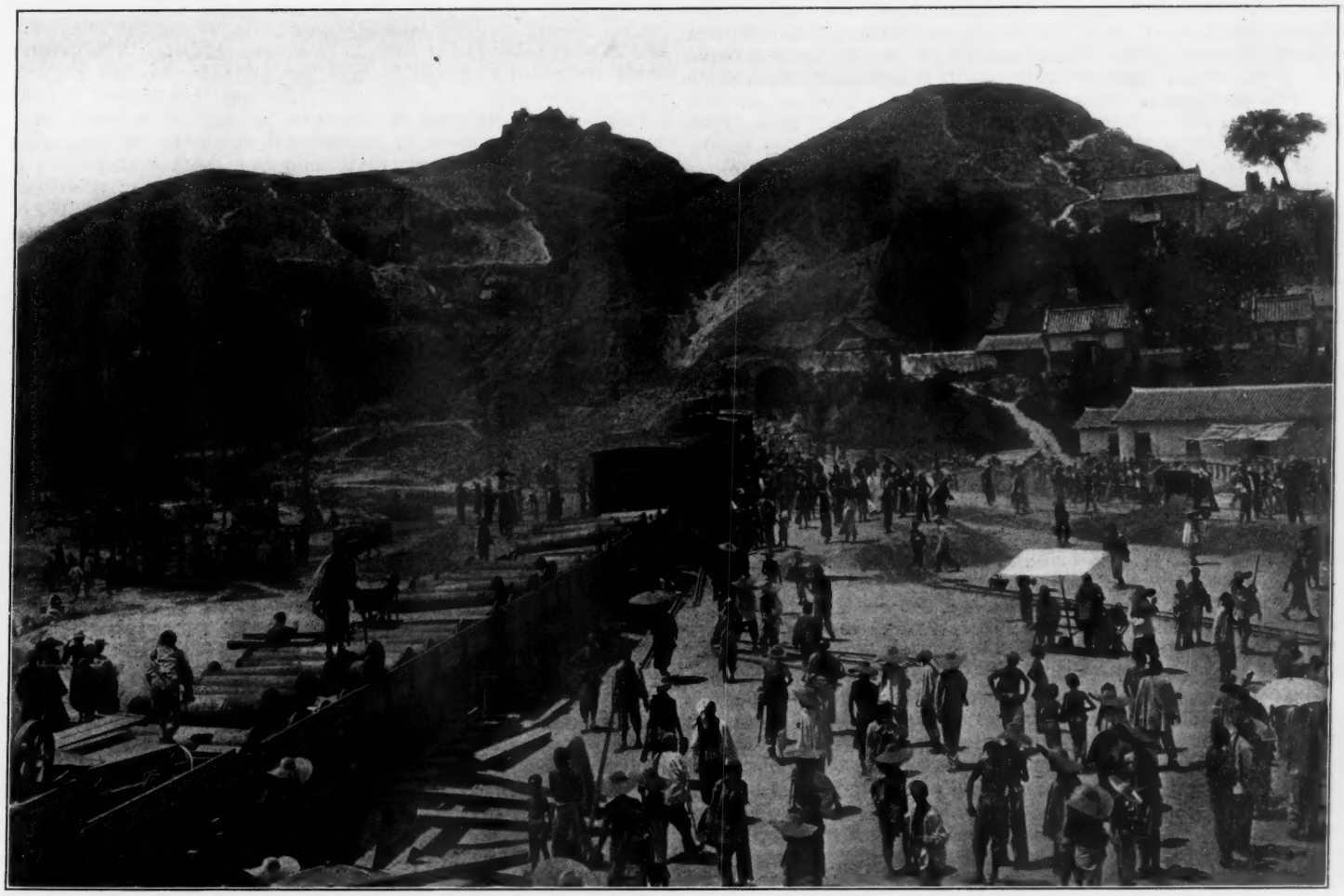
Coolies at Work in a Deep Cut; Peking-Hankow Railroad.

Partially Completed Embankment and Stone Arch Culvert.



Steel Bridge Over the Hwangho or Yellow River; Peking-Hankow Railroad.

Sin-Yang Station; Peking-Hankow Railroad.



South Portal of Tunnel Just South of Yellow River Bridge.

and demanding that he shall remain in custody until he can produce the very man who actually saw the bribes paid over. Besides all this, the seventy-two Hongs, which represent the shareholders, and the directors of the road have repudiated the meeting as unauthorized and at the same time are doing all in their power to prevent the reinstallation of the gentlemen of Hongkong whose original protest started all the trouble. Meanwhile the ex-viceroy, who was put out of office on account of the implications of dishonesty, has sent a telegram from Shanghai advising patience and deprecating anything like summary or unpremeditated action.

It is probable that the preliminaries of construction of the Peking-Hankow section of the through line were equally complicated, for the project was definitely outlined in 1889. In that year arrangements for building the line were entrusted to two viceroys, one of whom was Li Hung Chang, then viceroy of the province of Pechili. This is the northern province through which the road runs, the southern provinces being in order to the south Honan and Hupeh. These three provinces are among the most populous in China.

Years passed but the project made no progress. China was anxious to build the road entirely with her own resources, but the attempt to raise the funds in China was at last given up about the end of 1896, and the two viceroys who were promoting the road received authority to grant the concession to a company of the "most favored nation." They communicated first with the United States but were unable to arrange satisfactory terms. They then turned to Belgium, "a very wealthy, small country whose power is negligible" as they said in their report of December, 1897. About this time the French minister at Peking, reminding the Chinese government of an article of the Franco-Chinese treaty of 1885, which stipulated that "in the construction of railroads China will use all her influence to attract French industry," brought pressure to bear to give French capital a share in the project. On June 26, 1898, in spite of opposition from Great Britain, a revised concession was granted to a Franco-Belgian syndicate for construction of the road. This contract was more favorable than those previously granted to foreigners for building railroads in China. The earlier roads had been built at the risk of the concessionaries without any guarantee from the Chinese government. The Franco-Belgian syndicate, on the other hand, obtained not only the support of the Chinese Imperial Railway Administration, but the official assistance of the authorities at Peking, who issued a state loan of $22,500,000, guaranteed by the Chinese government and payable in 1929, in aid of the road. The syndicate had only to negotiate these bonds to secure funds. In March, 1899, this loan was issued simultaneously in Brussels and Paris and was immediately many times oversubscribed.

The first surveys and drawings for the line had already been made by the southern viceroy while the negotiations were going on. The road for a short distance from Hankow, its southern terminus, follows up the Yangtse river, and then traverses a broad plain. A little less than 100 miles north it zigzags between steep hills with picturesque scenery. Beyond this in another plain it crosses two smaller levels and then reaches the Yellow river (Hwangho), which it crosses on a bridge about 9,875 feet., or nearly two miles, long. The entrance to this bridge from the south is through a tunnel under a hill on whose summit a temple is erected consecrated to the divinity of the river. This temple and the southern entrance to the tunnel are shown in one of the accompanying photographs. All bridges, of which there are about 100 besides the Yellow river bridge, from 650 ft. to 2,200 ft. long, are steel with concrete approaches. One of the steel bridges on masonry piers, as well as a view of one of the piers and the method of construction, is shown in the photographs. There are only two tunnels, both short, on the whole line.

The construction of the road was begun at both ends at the end of 1898 and the beginning of 1899. In 1899 quays and work shops were built and rolling stock and construction materials received. The northern section of the road had been extended 114 miles south of Peking when it was interrupted in May, 1900, by the Boxer revolt. Most of the finished road was destroyed, many of the employees killed and the final completion of the road set back at least a year. Early in 1901 order was restored through the military occupation of Peking by the Powers and work resumed. There was no further interruption and the northern section of the road was steadily, although slowly, pushed to completion. A little more than half of the road was built from the north. The two working parties met a little south of the Yellow river.

On the southern end of the road 56 miles of line was built in 1900, the year of the Boxer trouble. In 1901 great damage was done to the embankments at Hankow by the flooding of the Yangtse river. As this is a usual summer happening, the slope of the embankment of the road on the river side was protected with stone, a work which was finished at the beginning of 1902. At Hankow a quay 15,748 ft. (about three miles) long, which can be used by deep draft vessels, was built along the river. The maintenance of this quay is costly as the current continually gnaws at it and undermines the foundations. Before the end of 1901, notwithstanding the inundations, the road was opened 96 miles north from Hankow. At first a weekly service in each direction was begun but after the beginning of 1902 there were three trains a week in each direction. Heavy cutting was necessary over the watershed between the Yangtse river and the Yellow river. In 1902 daily train service was begun between Hankow and Sin Yang, 136 miles north. This station is shown in one of the photographs. On January 1, 1904, the road was opened for 195 miles north of Hankow. At this point the road runs into a hilly country with the steepest grades on the whole line. At the beginning of December, 1904, rails were laid from Hankow to the Yellow river, 312 miles.

The steel bridge across the Yellow river, as already mentioned, is nearly two miles long. It is 20½ ft. above high water level. A general view is shown in the photograph. The bridge rests on screw pile piers. The piles were screwed down into the bed of the river by hand-capstans manned by coolies. To each pile was clamped a large grooved pulley around which was wound a wire hawser. One end was led to one of the capstans and then the coolies heaved away and the work of screwing began. The rotary motion with the corkscrew point at the bottom of the pile forced the pile down in the mud till the pulley was level with the platform on which the workmen were standing. When the pulley reached this platform, another section of pile was bolted on, the pulley raised to the upper flanges, and the screwing resumed. When the piles had been screwed to a sufficient depth, say 40 to 50 ft., the water was pumped out from the inside and the pile filled with concrete. Wooden piles were then driven in a triangle around the up-stream side of the piers with the points to the current, as a protection. Huge beds of tree branches, lashed together with wire, were then sunk around the steel piers, and on these beds many hundred tons of rock were thrown. This was to give more solidity to the river bed where the piers were driven. The river bed is one great quicksand and during the construction of the bridge many piles and platforms supporting machinery were sucked under. Stone breakwaters have been built along the banks of the river to prevent the undermining of the bridge foundations and each end of the bridge is protected with stone-faced dykes. Half of this bridge was built in France, the other half in Belgium, the work being distributed among the principal builders of the two countries.

The roadbed is well built and ballasted; the track, standard gage. Most of the material for the roadbed, as well as the rolling stock, was imported from Belgium and France. As there is little timber in China, even the ties were imported, 130,000 coming from France, 50,000 from the Baltic countries, a few from Oregon and the rest from Japan. The steel works of Hanyang, near Hankow, supplied about 175,000 tons of rails, which were tested by the same tests as those used by the Belgium government railroads. Seventy-five pound rails are used. At the close of 1905 there were in service 101 locomotives, 145 passenger cars (first, second and third class), and 2,200 freight cars of from 15 to 40 tons capacity. The passenger fares are about 9, 6 and 3 cents per kilometer for the respective classes. The syndicate which built the road has formed a mining company under the name of "Mines du Luhan," which holds the concession for development of several coal fields that will supply the road with excellent fuel. Sixty miles of short branches to coal mines have already been built. The railroad was built by the Societe d'Etude de Chemins de Fer en Chine. A supplementary issue of $2,500,000 bonds, under the same conditions as the original loan, was made in 1905 to meet the final expenses of construction and the purchase of rolling stock.

For the accompanying photographs we are indebted to the *Far Eastern Review* to which and to *Le Mouvement Geographique*, among other sources, we owe information in regard to the road.

Missouri Rate Laws.

The State Circuit Court at Kansas City, Mo., has issued orders to 18 principal railroads of that state requiring them to obey the 2-cent passenger-rate law and the maximum freight-rate law which went into effect June 13, but in the United States District Court the railroads are suing for an injunction to prevent officers of the state from enforcing these laws. Judge McPherson, in the United States District Court, will probably take up next week the question of conflicting jurisdiction. After his preliminary decision the railroads and the state agreed to a statement of facts as follows:

That the railroads' application for a temporary injunction as to the maximum freight laws of 1907 is sustained, and until further order of court herein the state officials are enjoined from attempting to recover any penalty or seeking to enforce that law.

As to the two-cent rate act, the order heretofore entered by the court enjoining the railroads from obeying that law shall remain in effect until June 19 next at 6 a. m., at which time the rates fixed by said act shall be put and kept in force for three months, without prejudice to the rights of either party, for the purpose of ascertaining more definitely the extent that experience will show that the rates under said act reduce or increase earnings of complainant.

GENERAL NEWS SECTION

NOTES.

The Delaware & Hudson has advanced the pay of conductors, baggagemen and trainmen 10 per cent.

The Interstate Commerce Commission has sent to the railroads of the country a circular asking what commissions are paid for the sale of tickets.

The bill before the legislature of Wisconsin to reduce all passenger fares in that state to 2 cents a mile has been killed. The Senate rejected it by a vote of 41 to 6.

The bureau of railroad statistics of the Canadian Government has decided to adopt whatever changes the Interstate Commerce Commission shall make in the classification of operating expenses in the annual reports of railroads.

The General Electric Co. has applied to the Interstate Commerce Commission for an order requiring the railroads to make it an allowance for switching and other terminal expenses at its plant in Schenectady, N. Y. The company has extensive yards and switching service of its own.

At New York City, June 18, the Central Vermont Railroad was indicted for the illegal payment of rebates of 1 cent per 100 lbs. on coffee shipped in 1904 from New York to Detroit. The consignee was the Woolston Spice Co., and the agent of the consignee in New York was Lowell M. Palmer.

The state railroad commissioners of Kansas, who were empowered by the last legislature to make a valuation of the railroads of the state, have decided to postpone the work until the Interstate Commerce Commission published the results of its studies in connection with this subject.

The Long Island Railroad on Decoration Day, May 30, carried 128,652 passengers, an increase of 28 per cent. over the number carried on May 30 last year. Throughout the year the average daily passenger traffic on this road amounts to about 60,000, being about 40,000 in winter and 80,000 in summer.

The Interstate Commerce Commission has issued a circular again reminding the railroads that applications for permission to change rates in less than 30 days must be more rigidly restricted. Notice is also given that tariffs and other documents arriving at Washington with insufficient postage will not be accepted.

The Pullman Company has sent to the Interstate Commerce Commission its reply in the complaint of George S. Loftus, of St. Paul, alleging excessive rates, and denies the jurisdiction of the commission. This means, apparently, that the company intends to contest the validity of the law which declares sleeping car companies common carriers.

The railroads of Texas have for sale a large quantity of cotton, said to be about 100,000 bales, most of which, by reason of the loss of tags or mistakes in loading, went astray at various times during the past season and was settled for by the railroads, claims for loss having been presented by the consignees. It is said that in consequence of the rise in price the railroads will make 3 or 4 cents a pound profit on this cotton.

The Governor of Illinois has signed a bill legalizing the consolidation in 1882 of the Chicago & Western Indiana Belt and the South Chicago & Western Indiana. This action was necessary because of an error made in the original consolidation. At that time, the Chicago & Western Indiana Belt was to be merged with the South Chicago & Western Indiana and the resultant company consolidated with the Chicago & Western Indiana Railroad, but instead all three companies were merged at once.

The United States Circuit Court at Baltimore, Md., on the application of the Pitcairn Coal Co., has issued a mandamus requiring the Baltimore & Ohio to include shippers' cars in its basis of computation for ascertaining the number of cars to which each mine is entitled for loading coal. The application for a mandamus included several other points, but on all except this one the application was denied. The complaint was that when the supply of cars was short the road favored the Consolidated Coal Co. and the Fairmount Coal Co. These companies had 5,500 cars of their own, but the railroad company allowed them as full a percentage of railroad companies' cars as if they had had none. On this feature of the case the action of the court favored the complainants.

It is announced in Chicago that the three principal lines between that city and Cincinnati will, on July 1, reduce the through fare to $6, which is about 2 cents a mile. This action is based, it is said, not on the new laws passed by Illinois, Indiana and Ohio, which do not apply to interstate rates, but on the action of the new line, the Chicago, Cincinnati & Louisville, which proposes to charge only $5. It is said that some interstate rates in the states named are to be reduced, within a month or two, to the basis of 2 cents a mile, but no particulars are given. In Illinois the 2-cent law goes into effect July 1. In Iowa it goes into effect July 14. It is expected that the railroads will contest the laws in both of these states. In Minnesota the reduced rates went into effect May 1 and in Nebraska March 7. Efforts are being made in both of these states to secure injunctions against the enforcement of the laws.

Adams Express Company "Melon."

Holders of the $12,000,000 capital stock of the Adams Express Co. are to get a 200 per cent. dividend in the form of $24,000,000 collateral trust 4 per cent. distribution bonds of 1947, which will be given to stockholders of record on June 27 at the rate of $200 bonds for each share of stock held.

New North German Lloyder.

The North German Lloyd Steamship Company announces that it is building a new vessel, second only in size to the Mauretania and Lusitania, of the Cunard Line, and of the moderate speed type, with which the Hamburg-American and White Star lines have been very successful. This ship, named the George Washington, will be of 27,000 gross tons, 720 ft. long, 78 ft. wide, 54 ft. deep, 33 ft. draft and 18 knot speed.

The Tramp Nuisance.

With few exceptions the local authorities do not assist the railroads in checking the tramp nuisance. In not a few cases actual encouragement is given to those who prey on railroad property. In cases where tramps have broken into cars and were caught in the act of stealing the local authorities have declined to take action. They declare that it is not their business to prosecute suits for the railroads. The remedy must begin with co operation between the railroads and the authorities of every community through which it passes. There should be as prompt prosecution of an offender against a railroad as of one against an individual. There should be no more suspended sentences on account of leaving town. There should be confinement at hard labor for a fixed period for every tramp. It is now the almost universal custom for the officers before whom the vagrants are brought in petty cases to order them to leave town within 24 hours.—*J. J. Hill, Great Northern Ry.*

Many communities have solved the tramp problem by imposing a long term of hard work upon wanderers, but nobody has paid much attention to the woes the "hoboes" have brought upon railroad officials. The largest roads in the country show that the vigilance of villagers has only aggravated the problem. The majority of villages prefer to save money and trouble by running tramps out of town. If the states would relieve the villages of the cost of prosecuting and maintaining vagrants rigorous treatment of the latter would result, and the swarms of petty marauders would be greatly reduced. But even state control will not solve the problem until farmers' wives will listen to reason and withhold mince pie. * * * Good nature and timidity can thwart the wisest lawmakers. —*New York Tribune.*

New Buildings at Rensselaer Polytechnic Institute.

On commencement day of the Rensselaer Polytechnic Institute on June 12 the new main building, Carnegie Hall, the gift of Andrew Carnegie, and the Dr. William Weighton Walker chemical laboratory, the gift of graduates and friends of the institute, were dedicated. President Palmer C. Ricketts announced that through the gift of $1,000,000 from Mrs. Russell Sage two new courses in engineering will immediately be established; one leading to the degree of mechanical, the other to the degree of electrical engineer. Of the gift, $700,000 is to be invested and the income used for maintenance. The following committee of graduates, which is significant of the success of Rensselaer graduates, has been named to formally send thanks to Mrs. Sage: Theodore N. Ely, Chief of Motive Power of the Pennsylvania Railroad; William B. Ridgely, Comptroller of the Currency; Edward C. Carter, Chief Engineer of the Chicago North-Western; William H. Courtenay, Chief Engineer of the Louisville & Nashville; Harry H. Rousseau, Rear-Admiral United States Navy and member of the Panama Canal Commission; William P. Mason, Professor of Chemistry of the Rensselaer Polytechnic Institute; Washington A. Roebling, Vice-President John A. Roebling

Company, Trenton, N. J.; David Reeves, President Phoenix Iron Company of Philadelphia; Isaac W. Frank, President United Engineering & Foundry Company, Pittsburg, Pa.; Nelson P. Lewis, Chief Engineer Board of Estimate and Apportionment, New York City; O. F. Nichols, Chief Engineer Department of Bridges, New York City; Arthur B. de Saulles, Superintendent of the Bethlehem works of the New Jersey Zinc Company; Frank G. Smith, Brigadier-General, U. S. A., retired, Secretary of the Chicamauga and Chattanooga National Park; T. Guilford Smith, Regent of the New York State University; I. M. de Varona, Chief Engineer Department of Water Supply of New York; William H. Burr, Professor of Civil Engineering of Columbia University; J. Van W. Reynders, General Manager Pennsylvania Steel Company, Steelton, Pa.; A. L. A. Himmelwright, General Manager Roebling Construction Company, New York, and George S. Groesbeck, President Springfield Construction Company, Springfield, Mass.

New York 16-Hour Law.

Governor Hughes, of New York, has signed the bill of Senator Page amending the penal code to make it a misdemeanor for a railroad to permit any employee engaged in or connected with the movement of any train to remain on duty more than 16 consecutive hours, or to require or permit any such employee who has been on duty 16 consecutive hours to go on duty without having had at least 10 hours off duty; or to require or permit any such employee who has been on duty 16 hours in the aggregate in any 24-hour period to continue on duty, or go on duty, without having had at least 8 hours off duty within the 24-hour period, except when by casualty occurring after such employee has started on his trip, or by unknown casualty occurring before he started on his trip, and except when by accident or unexpected delay of train scheduled to make connection with the train on which such employee is serving, he is prevented from reaching his terminal.

Honorary Degree for J. M. Graham.

The honorary degree of Doctor of Engineering has been conferred by the Kentucky State College on J. M. Graham, Fourth Vice-President of the Erie, who is a graduate of the college.

Passenger Results Under Two-Cent Law in Ohio.

The following is a quotation from the annual report just issued by the Pittsburg, Youngstown & Ashtabula for the year ended December 31, 1906:

> The number of passengers carried increased 92,232, or 15 per cent., with an increased passenger mileage of 1,423,852 miles, or 13 per cent., and an increase in passenger train-mileage of 18 per cent. There was a decrease in the earnings per passenger per mile of 0.11 cent, due to the enforced reduction in the passenger rate caused by the recent legislation in the state of Ohio, providing for a maximum rate of 2 cents a mile, which went into effect in March, 1906; and this decrease in earnings, taken in conjunction with an increase in the cost per passenger per mile of 0.26 cent, increased the loss per per passenger per mile from 0.58 cent to 0.95 cent, or 64 per cent. This result, which was not unexpected by your officers, goes to show conclusively that the increase in the number of passengers carried does not compensate for the large reduction in the rate.

Enterprise Transportation Company.

This company, known as the New Line, has attained its second anniversary, and has issued a circular relative to its competition with the New Haven interests on Long Island Sound. The company now operates two services, one from New York to Providence and one from New York to Fall River, and has a fleet of five steamers.

INTERSTATE COMMERCE COMMISSION RULINGS.

In an opinion by Commissioner Clark on the case of Barden & Swarthout vs. Lehigh Valley the Commission gave its first opinion under the amendment giving power to require connections to private sidings. Complainants petitioned for a connection to a proposed industrial siding in Geneva, N. Y. A verbal understanding was had between complainants and the carrier in 1904 for the construction of the siding. Complainants refused to agree that coal business should never be carried on in connection with the siding, and the carrier refused to make the connection. Complainants brought suit in court, proper service was not had, and case was abandoned. After the act to regulate commerce was amended, complaint was filed with the Commission. The Commission does not recognize the right of a carrier to dictate as to the business which will be conducted at a siding which is connected with its lines, excepting so far as may be reasonable with regard to dangerous commodities. Complainants must, however, make written application upon the carrier in order for the Commission to have jurisdiction, and such written application must be made subsequent to the date upon which the amendment to the law became effective. No such application has been made and the case is therefore dismissed because of lack of jurisdiction.

The Commission announces the dismissal for want of prosecution of the complaint of the Producers' Pipe Line Company vs. St. Louis, Iron Mountain & Southern et al. The Commission holds that in formal proceedings before it, complaints must be prosecuted with reasonable diligence when a case has been formally assigned for hearing on a certain day, the parties must appear and present evidence, or, in advance of the date set, request postponement on stated grounds, showing good and sufficient cause for delay. The case in question was twice assigned for hearing at Kansas City, but on each occasion the complainant failed to appear.

The Commission after much reflection has taken up the question of the law relating to posting of tariffs. The impracticability of posting at every station or office all of a carrier's tariffs, and the difficulties which would be met with in an effort so to do, are recognized and appreciated, and the propriety of some modification of the requirements of the law is conceded. Such modification, however, must not be so radical or sweeping as to amount to nullification, and it is practically impossible to deal efficiently with the question by a general order. The Commission has therefore decided to try the plan outlined below, depending upon the honor and good faith of each official to resolve doubts in favor of the spirit of the law. If the plan fails to prove satisfactory in any instance because of failure to so deal with it, the only alternative will be literal compliance with the terms of the act.

Ordered, that the principal traffic official * * * shall, on or before August 1, 1907, file with the Commission a request for modification accompanied by (1) a list of the points (stations) on its lines at which the volume of traffic and number of shippers are sufficiently large to reasonably call for full compliance with the terms of the act, and (2) a list of points (stations), not included in list (1), at which agents are regularly on duty and at which tariffs containing rates applicable to or from those points should be posted, and also by statement of the special reasons upon which such request is based.

The intention is to require that at points at which all tariffs are not posted a complete file of that carrier's tariffs shall be kept in charge and custody of the agent, and that notices shall be posted in two conspicuous and public places in every station, warehouse or office at such point that (*a*) "The rate schedules of this company which contain rates applying to or from this station are here posted. Additional schedules are on file with the agent, and can be inspected on request"; or (*b*) "The rate schedules of this company are on file with the agent, and can be inspected upon request."

The Commission will reserve the right to cancel at any time any order that may be issued hereunder to any carrier, and also the right to at any time require any carrier to add the names of any of its stations to any list named in such order.

The Commission decides that "posting," as here used, does not necessarily mean attaching to the wall. The law requires that schedules shall be posted in such form that they shall be accessible to the public and can be conveniently inspected. Placing them in a case or cupboard which is accessible to the public would be compliance with this requirement. The term "station" used in this connection to indicate point on carrier's lines will be understood and held to include all of that carrier's stations, warehouses or offices which are located at that station—that is, in that city or town.

A tariff circular was promulgated June 17, containing a revision of previous circulars and setting forth in consolidated and simplified form all the live matter shown in previous tariff circulars. Many changes have been made in the rules covering the construction and filing of tariffs. The new rules permit carriers to authorize fast freight line agents to act for them in the publication and filing of tariffs. Tariffs covering rates to and from points on new lines shall bear notice that they apply to new stations to and from which no rates have theretofore applied.

Carriers may lawfully make special rates for the movement of federal troops when such movement is under orders and at the expense of the United States government, and rates so made need not be posted or filed. This applies to similar transportation for the naval and marine services. No traffic or transportation can be the subject of special agreement between carrier and shipper, and the provision contained in classifications to the effect that high explosives will be taken only by special agreement is held to be wrong. The classification should state that such traffic is subject to regulations and rates in tariffs, and tariffs must provide the regulations applicable to the traffic.

Shipments which are refused by consignees may be reconsigned under application of the through rate from point of origin to final destination, either with or without the exaction of the reconsignment charge, and it is not deemed improper that articles damaged in transit be returned free or at reduced rates if tariffs contain rules so providing. Instructions of shippers as to intermediate rout-

ing cannot be disregarded by carriers, unless the initial carrier reserves the right to dictate intermediate routing, and carriers will be held responsible for the routing shown in bills of lading. Overcharges on account of misrouting by a carrier may be adjusted as to shipments moving after March 18, 1907, the authority therefor being limited strictly to cases in which rates are covered in tariffs effective at the time the shipment moved and lawfully applicable thereto.

The Commission will give no consideration to tariffs which are not received at its office in time to give the statutory notice. Literal compliance with the law in that respect will be exacted.

MANUFACTURING AND BUSINESS.

The American Car & Foundry Company, New York, is planning to build a steel car plant at Gary, Ind., on land adjoining that of the United States Steel Corporation.

The Minnesota Steel Co. has been incorporated in Minnesota with $10,000,000 capital. It is said that the new company will operate the United States Steel Corporation's plant at Duluth.

A semi-annual dividend of 2½ per cent. on the common stock of the Standard Coupler Company has been declared, payable June 29. The last semi-annual dividend on this stock was 2 per cent.

Iron and Steel.

The Grand Trunk Pacific is reported to be in the market for 71,000 tons of rails.

The Pittsburg Railway & Light Company has ordered 3,800 tons of rails; the Lexington & Interurban, 1,600 tons; a Cleveland line, 500 tons, and additional miscellaneous orders from electric lines aggregate 1,500 tons.

The Chicago, Milwaukee & St. Paul has given an order to the American Bridge Company for 575 tons of steel for bridges, making the aggregate quantity ordered recently by this company 5,000 tons. The Louisville & Nashville has ordered from the Louisville Bridge Company 100 tons, and the Hocking Valley 725 tons from the Mount Vernon Bridge Company.

The Central of Georgia has ordered 10,000 tons of rails from the Pennsylvania Steel Company; the Cincinnati, Hamilton & Dayton 4,000 tons from the Carnegie Steel Company, and the Grand Trunk 30,000 tons from the Lackawanna Steel Company. An order for 14,000 tons has been given to the United States Steel Products Export Company for export to Peru.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

Iron and Steel Institute.

The autumn meeting of this institute is to be held in Vienna Austria, September 23-25, 1907. The reception committee has arranged a number of excursions. The papers to be read and discussed will be announced later. Visitors to this meeting may secure reduced rates from London via Switzerland on application to G. K. Turnham, at the Tourists' Agency of the Great Northern Railway, 2 Charing Cross, London, S. W.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Arkansas Western.—E. P. Hall has been appointed Assistant Auditor, with office at Kansas City, Mo., succeeding W. V. Bolman.

Baltimore & Ohio.—Hugh L. Bond, Jr., Second Vice-President and General Attorney, has been elected Second Vice-President and General Counsel. John G. Williams, Assistant General Attorney, succeeds Mr. Bond as General Attorney. Herbert R. Preston, Assistant General Attorney, has been appointed General Solicitor.

Butte, Anaconda & Pacific.—M. S. Dean, Vice-President, has been elected First Vice-President. B. B. Hayes has been elected Second Vice-President.

Erie.—W. J. Harahan, Vice-President of the Illinois Central, has been appointed Assistant to the President, succeeding C. S. Sims, now Second Vice-President of the Delaware & Hudson.

Gulf & Interstate.—Charles H. Moore, formerly President of the Peach River & Gulf, has been elected Vice-President of the Gulf & Interstate. George Sealy has been elected Secretary. R. W. Smith has been elected Treasurer, succeeding W. C. Brothers. The offices of all are at Galveston, Tex.

Illinois Central.—See Erie.

Isthmian Canal Commission.—E. S. Benson, General Auditor, has resigned.

Manistee & Grand Rapids.—W. T. Joyce, President of the Minneapolis & Rainy River, has been elected also President of the Manistee & Grand Rapids. John Crocker has been elected Vice-President.

Minneapolis & Rainy River.—See Manistee & Grand Rapids.

Northern Pacific.—The authority of all officers of the Northern Pacific will, on July 1, be extended over the Washington & Columbia River.

Pan-American.—The general offices of this company have been removed from Mexico City, to San Geronimo, Oaxaca.

Panama Railroad.—E. S. Benson, General Auditor, has resigned.

San Pete Valley.—F. R. Coates, formerly Chief Engineer of the Chicago Great Western, has been elected President, and T. H. Fitzgerald, Vice-President.

Washington & Columbia River.—See Northern Pacific.

Operating Officers.

Baltimore & Ohio.—J. H. Rosenstock, general yardmaster at New Castle Junction, Pa., and John Niland, general yardmaster at Cumberland, Md., have been appointed to the new offices of Inspectors of Yards, reporting to the General Manager, with jurisdiction over all yards on the road. Their inspections will have particular reference to car movement.

J. K. Graham, agent at Wheeling, W. Va., and C. L. Johnson, agent at Columbus, Ohio, have been appointed to the new offices of Inspectors of Station Service, reporting to the General Manager.

Gulf & Interstate.—F. N. Dever, station agent of the Gulf, Colorado & Santa Fe at Somerville, Tex., has been appointed to the new office of General Manager of the Gulf & Interstate.

Hocking Valley.—R. M. Connell has been appointed Trainmaster, succeeding C. L. Gardner, now Assistant Superintendent of the Toledo & Ohio Central.

Missouri, Kansas & Texas of Texas.—A. D. Bethard, Superintendent of Transportation, has been appointed Assistant General Manager, with office at Dallas, Tex. J. W. Walton, Superintendent of the St. Louis & San Francisco at Francis, Ind. T., succeeds Mr. Bethard, with office at Denison, Tex.

Northern Pacific.—Henry C. Nutt, who was recently appointed General Manager of the Northern Pacific lines west of Trout Creek, Mont., was born on November 20, 1863, at Council Bluffs, Iowa. He graduated from the Sheffield Scientific School of Yale University in 1883 and entered railroad service in that year on the Burlington & Missouri River Railroad in Nebraska, now part of the C., B. & Q., where he worked as rodman and resident engineer until 1889. In that year he was appointed Trainmaster of the Wyoming division, and in 1892 Assistant Superintendent of the same division, with headquarters at Edgemont, S. Dak. In 1894 he was Assistant Superintendent at Sheridan, Wyo., and in 1900 Assistant Superintendent of the Burlington lines in Iowa, with headquarters at Burlington, Iowa. After five years of service in this position, he was, in 1905, appointed General Superintendent of the Missouri district, with headquarters at St. Louis, and in the next year went to the Michigan Central as General Superintendent. He now leaves the Michigan Central to become General Manager of the western lines of the Northern Pacific, with headquarters at Tacoma, Wash.

Henry C. Nutt.

I. B. Richards has been appointed Superintendent of Transportation, with office at St. Paul, Minn.

St. Louis & San Francisco.—See Missouri, Kansas & Texas of Texas.

Southern Pacific.—W. A. McGovern, Superintendent of the Tucson division, has been appointed Superintendent of the Coast division, with office at San Francisco, Cal., succeeding J. C. Wilder, assigned to other duties. W. H. Averell, Assistant Superintend-

ent at Bakersfield, Cal., succeeds Mr. McGovern, with office at Tucson, Ariz. F. M. Worthington has been appointed Assistant Superintendent at Tucson, succeeding D. T. Costello, assigned to other duties.

The authority of A. H. Iliohan, Assistant Superintendent of Telegraph of the Pacific system, has been extended over the lines east of Sparks, Nev., of the Southern Pacific Company, and over the Arizona Eastern, the Arizona & Colorado, the Gila Valley, Globe & Northern and the Sonora Railway.

Tehuantepec National.—F. D. Hamilton has been appointed Superintendent of the Salina Cruz terminals, succeeding H. A. Tolle, resigned.

Traffic Officers.

Atlanta, Birmingham & Atlantic.—W. H. Leahy, division passenger agent of the Atlantic Coast Line at Savannah, Ga., has been appointed General Passenger Agent of the A., B. & A., with office at Atlanta, Ga., succeeding, as General Passenger Agent, J. J. Campion, whose title has been changed from General Freight and Passenger Agent to General Freight Agent.

Mississippi Central.—Walter P. Emerson has been appointed General Freight and Passenger Agent, with headquarters at Hattiesburg, Miss.

Engineering and Rolling Stock Officers.

Michigan Central.—W. H. Sellew, Division Engineer at Detroit, Mich., has been appointed Principal Assistant Engineer, with office at Detroit. Mr. Sellew is succeeded by W. C. Cleveland.

New York, New Haven & Hartford.—W. J. Black, Engineer of Maintenance of Way, has been appointed Assistant Engineer of Construction, in charge of the New Haven improvements.

Special Officers.

Erie.—Harrison Williams has been appointed General Land and Tax Agent, succeeding to the duties of W. E. Talcott, Real Estate Agent, who has resigned and whose office has been abolished. E. M. Hunt, Land and Tax Agent of the Ohio division of the Erie and of the Chicago & Erie, and G. H. Palmer have been appointed Assistant General Land and Tax Agents. H. M. Merrihew succeeds Mr. Hunt, with office at Cleveland, Ohio.

LOCOMOTIVE BUILDING.

The Southern has ordered four consolidation locomotives from the American Locomotive Company.

The Norwood & St. Lawrence has ordered one mogul locomotive from the American Locomotive Company.

The Williamette Construction Company has ordered two electric locomotives from the American Locomotive Company.

The C. H. Sharp Contracting Company has ordered two prairie locomotives from the American Locomotive Company.

The Sabina Coal Company, Mexico, has ordered one prairie saddle tank locomotive from the American Locomotive Company.

The Virginia & Southwestern, as reported in the *Railroad Gazette* of June 1, has ordered three consolidation locomotives from the American Locomotive Company.

The Angelina & Nechcs River, Keltys, Tex., has ordered one simple mogul locomotive from the Baldwin Locomotive Works. The specifications are as follows:

General Dimensions.

Type of locomotive	Mogul
Weight, total	79,000 lbs.
Weight on drivers	66,000 "
Diameter of drivers	48 in.
Cylinders	15 in. x 22 in.
Boiler, type	Wagon top
" working steam pressure	200 lbs.
" number of tubes	150
" diameter of tubes	2 in.
" length of tubes	9 ft. 2¼ in.
Firebox, length	49 13/16 "
" width	34⅜ "
" grate area	12 sq. ft.
Heating surface, total	800 "
Tank capacity	2,500 gals.

Special Equipment.

Air-brakes	Westinghouse
Couplers	Trojan
Injector	Hancock
Safety valve	Crosby
Sight-feed lubricators	Nathan

CAR BUILDING.

The Atchison, Topeka & Santa Fe has ordered 35 way cars from the American Car & Foundry Company.

M. P. and J. T. Davis, Quebec, Que., have ordered 20 Hart convertible cars from the Dominion Car Company.

The Louisville & Eastern, Louisville, Ky., has ordered two express cars from the McGuire Cummings Manufacturing Company.

The Keystone Equipment Company, New York, is reported to be in the market for from 10 to 15 new dump cars and 40 second-hand dump cars.

The Waterloo, Cedar Falls & Northern, Waterloo, Iowa, has ordered 14 single truck cars from the McGuire Cummings Manufacturing Company.

The Union Pacific has ordered 40 oil tank cars of 100,000 lbs. capacity for September delivery from the Cambria Steel Company. The cars are duplicates of the 156 cars ordered last year, having tank capacity of 12,500 gallons.

The National Car Line Co., Chicago, has ordered 20 tank cars of 80,000 lbs. capacity from the Bettendorf Axle Co., for July and August delivery. These cars will be 31 ft. long and 9 ft. wide, over all. The special equipment includes:

Axles	Griffin Wheel Co.
Bolsters	Bettendorf
Brake-beams	Damascus
Draft rigging	Cardwell
Dust guards	Harrison
Trucks	Bettendorf
Wheels	Griffin Wheel Co.

The Chicago Great Western, as reported in the *Railroad Gazette* of June 14, has ordered 1,000 wooden box cars of 100,000 lbs. capacity from the Pullman Company. These cars will measure 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements. The special equipment includes:

Brake-beams	Simplex
Brakes	Westinghouse
Draft rigging	Street
Journal boxes	McCord
Roofs	Chicago
Trucks	Barber
Wheels	Griffin

The Atchison, Topeka & Santa Fe, as reported in the *Railroad Gazette* of June 14, has ordered three cafe observation cars from the Pullman Company for September delivery. These cars will measure 67 ft. 10 in. long, inside measurements, and 10 ft. wide over sills. The special equipment includes:

Brake-beams	Diamond special
Brakes	Westinghouse
Couplers	National
Curtain fixtures	Forsythe
Draft rigging	Miner
Journal boxes	Symington
Trucks	Atchison, Topeka & Santa Fe standard
Vestibules	Pullman

RAILROAD STRUCTURES.

Blaisdell, N. Y.—The Buffalo & Lake Erie Traction is planning to put up a new power plant near Athol Springs. Plans are also being made for a new car house to replace the structure recently destroyed at this place.

El Reno, Okla.—The Chicago, Rock Island & Pacific has given a contract to Sharp Bros. for grading at the site of its proposed new terminal here. The contract, it is said, amounts to about $200,000.

Halifax, N. S.—A steel bridge is to be built by the Halifax & Southwestern.

Lebanon, Pa.—Upon the completion of the new Fourth street overhead bridge of the Philadelphia & Reading, the same company will erect a similar bridge at Front street.

Lethbridge, Alb.—Bids will soon be asked for the construction of the new steel bridge, to be 5,500 ft. long and 300 ft. high. The estimated cost is $1,000,000. Address J. Schwitzer, Chief Engineer, Winnipeg, Man.

Montreal, Can.—Local reports state that officials of the Canadian Northern announce that machine shops are to be put up at Longue Pointe.

Ottawa, Ont.—Bids are wanted by P. E. Ryans, Secretary of the Transcontinental Railway Commission, for building five steel bridges.

Pittsburg, Pa.—The Pittsburg, Harmony, Butler & New Castle, it is said, will put up a car barn about six miles from this place. The proposed structure will be of brick 47 ft. x 60 ft. The Miller & Stewart Construction Company has the contract for the work.

San Antonio, Tex.—The Railroad Commission of Texas has decided to order the International & Great Northern to put up a new passenger station here. The cost of the improvements will be about $150,000.

Toronto, Ont.—The Railway Commissioners have authorized the construction of a steel bridge at Sunnyside, the cost to be borne by the city and the railroads over whose track the bridge will cross.

Plans are to be submitted for approval to the city authorities for a proposed viaduct and terminal station here.

Winnipeg, Man.—Contracts reported let to the J. McDiarmid Construction Company, of this place, for additions to the Canadian Pacific shops and car sheds. The cost of the improvements will be about $125,000.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

BIG FORK & INTERNATIONAL FALLS.—See Northern Pacific.

BROOKLYN RAPID TRANSIT.—This company has begun operation on its Brighton Beach line, which it has been improving during the last two years. From Prospect Park south to Fiske Terrace the line is depressed; the rest of the way it is on an embankment. It is a four-track line which is to cost $2,000,000; half the expense is to be borne by the city and the rest by the railroad company. In addition, the railroad spent about $500,000 for new brick stations along the route and for other improvements.

CANADIAN PACIFIC.—Contract is reported let to W. F. Braden, of Strasburg, Sask., for building 40 miles of the new branch north from Strasburg.

DETROIT TERMINAL.—An officer writes that this belt line from the easterly limits of Detroit, Mich., at the Detroit river to a connection with the Grand Trunk and Michigan Central, about five miles, has been finished and is now in operation. The Grand Trunk, the Detroit, Grand Haven & Milwaukee, the Lake Shore & Michigan Southern and the Michigan Central each have a quarter interest in the line, which is operated as an independent terminal railroad. H. B. Ledyard, President, Detroit.

DOUGLAS & COOS (ELECTRIC).—Incorporated in Oregon with $500,000 capital and office at Marshfield. The company proposes to build an electric line from Roseburg northwest to Marshfield about 50 miles. The incorporators include: A. C. Marsters, P. L. Phelan, L. J. Simpson, L. H. Hazard, E. L. Wheeler and J. H. Flanagan.

EL DORADO & WESSON.—This company, building from El Dorado, Ark., to Wesson, 10 miles, an officer writes, has track laid from Wesson north for three miles. James Harrington, Chief Engineer, Hot Springs, Ark. (Mar. 15, p. 383.)

ERIE.—Work, it is said, has been resumed on the Genesee River Railroad building from Hunts, N. Y., south to Cuba, 30 miles. About half of the line was finished when work was suspended about April 1.

FRIO VALLEY.—Surveys, it is said, have been made by this company, recently incorporated in Texas to build a line from the Southern Pacific near Chatfield, Tex., north to Leakey, about 40 miles. Grading work is to be started early in August. (May 24, p. 727.)

GENESEE RIVER RAILROAD.—See Erie.

GRAND TRUNK.—Contract is reported let to McRae, Chandler & McNeil for second track work on the St. Lambert-Ste. Rosalie branch between St. Lambert and Ste. Rosalie, Que., 32 miles.

GRAND TRUNK PACIFIC.—Contracts are reported let to C. P. Wright, of Portage la Prairie, Man., for grading three miles of line between Portage la Prairie and Winnipeg, Man.

The National Transcontinental Commission is asking bids for the construction of an eight-mile section of the line east from Chipman, N. B.

HUDSON & MANHATTAN.—Work has been started on the proposed tunnel under Railroad avenue, in Jersey City, N. J., to form part of a line to Newark from the western end of the tunnel under the Hudson river.

IDAHO & WYOMING.—See Oregon Short Line.

INTERBOROUGH RAPID TRANSIT COMPANY.—See New York Subways.

KANSAS CITY SOUTHERN.—Surveys have been made and rights of way nearly all secured for an extension of this road to New Orleans. The projected route is from Leesville, La., southeast via Oberlin and Eunice to Crowley on the Southern Pacific, which road is to be paralleled as far as New Iberia, thence east and southeast between the Texas & Pacific and the Southern Pacific to New Orleans, about 250 miles. While the question of building this extension has been under consideration for some time, no definite action has yet been taken to carry out the work.

KENTUCKY NORTH & SOUTH.—This company, which has projected a line from Fullerton, Ky., on the Ohio river opposite Portsmouth, Ohio, south to Bristol, Tenn., about 250 miles, where connection is to be made with the Southern Railroad, has surveys made for about half of the distance, and 85 per cent. of the right of way secured. E. S. Parsons, Springfield, Ohio, is making surveys. (Mar. 15, p. 386.)

KEWEENAW CENTRAL.—An officer writes that contracts have been let to J. J. Byers & Co., of Houghton, Mich., for extending the main line of this road from Mohawk, Mich., southwest to Calumet, six miles, and branches from Mandan to the Keweenaw Copper Company mines, four miles, and from Phoenix to Eagle River, two miles.

MINNESOTA & INTERNATIONAL.—See Northern Pacific.

MISSOURI & NORTH ARKANSAS.—On the extension of this road from Seligman, Mo., northwest to Joplin, about 50 miles, for which contracts were let to L. S. Joseph and M. C. Burt, of Leslie, Ark., and Cape Girardeau, Mo., work is reported under way from Woodruff, in Barry County, northwest to Neosho, and grading is expected to be finished on this 30-mile section next month. On the extension from the southern end of the road at Leslie, Ark., southeast to Helena, it is expected to have grading finished this year to Searcy, 96 miles. Contracts for this work let to Scott & Dalhoff, of Neosho, Mo. Contracts reported recently let for building the first 40 miles from Helena, northwest, and additional contracts will probably be let this year for the remaining section to Searcy, about 40 miles. (March 15, p. 387.)

MISSOURI PACIFIC.—According to reports from Springfield, Mo., the Springfield-Crane branch of this road, recently finished, is to be extended north to the Missouri Pacific line at Bagnell, about 120 miles. Work, it is said, will be started from the northern end at Bagnell next month.

NEW YORK CITY SUBWAYS.—The Board of Rapid Transit Commissioners has given to the Bradley Contracting Company three contracts, aggregating $3,745,766, for the construction of the remaining sections of the subway loop to connect the Manhattan and Williamsburg bridges in the Borough of Manhattan; and additional contracts at $103,840 for pipe galleries in these sections. The work includes the section from Pearl street to Park Row, to cost $998,328 and $5,500 for the pipe galleries; from the new extension from Center street to the Bowery on Delancey street, to cost $1,518,302 and $29,040; and from the Bowery to Norfolk and Delancey streets to cost $1,229,136 and $69,300.

At a recent meeting of the Board of Rapid Transit Commissioners, New York City, the construction of a fourth track in the subway of the Interborough Rapid Transit Company, between 96th and 103d street, was authorized. The cost of the work will be about $850,000. (April 12, p. 531.)

NIAGARA, ST. CATHARINES & TORONTO.—This company is planning extensions to its system in addition to the lines it is building from St. Catharines to Niagara-on-the-Lake, to Welland and Grimsby Park. The St. Catharines-Welland line under contract to Joseph Battle, of Thorold, Ont., will soon be finished. An extension of the electric line is projected from Niagara Falls to Fort Erie. (Mar. 15, p. 396.)

NORTHERN PACIFIC.—An extension of the Minnesota & International, from Big Falls, Minn., northeast via Grand Falls, Wakana, Littlefork and Nakoda, to International Falls, 34 miles, is being built under the name of the Big Fork & International Falls Railway. An officer writes that track is laid for 19 miles. Dempsey & Dougherty, Minneapolis, Minn., have the contract for the grading, which is nearing completion. There are to be two steel bridges, one 275 ft. long and the other 185 ft. (March 15, p. 388.)

OREGON SHORT LINE.—An officer writes that location surveys have been made for building the Idaho & Wyoming from Elva, Idaho, east to Jackson, Wyo., 105½ miles. Work on this line has not yet been started.

PAN-AMERICAN.—According to reports from Mexico City, this company may abandon the plan to extend this road beyond the Mexico-Guatemala boundary. Negotiations are pending in Guatemala and San Salvador for concessions, which it is said will be withdrawn. The road is in operation from San Geronimo, near Salina Cruz, on the Pacific coast in Mexico, to a point 60 miles from the Guatemala boundary. (May 10, p. 663.)

PANHANDLE ELECTRIC & POWER COMPANY.—Incorporated in Idaho to build an electric line from Sand Point, Idaho, northwest to Coolin at the outlet of Priest lake, about 15 miles. The incorporators include: T. W. Payne, Detroit, Mich.; A. Coolin, Priest River; A. J. Smith and H. H. Wallace, Spokane, and J. R. Jones, Hillyard. The project is to be financed by Eastern capitalists, and power is to be generated below the outlet of Priest lake near the Priest river valley.

PULLMAN, LA CROSSE & COLUMBIA RIVER (ELECTRIC).—Plans are being made to organize a company under this name in Washington to build an electric line from Pullman west to La Crosse and Hooper, 42 miles. Connection is to be made at Pullman with the Oregon Railroad & Navigation Company. J. O. Staats, of La Crosse, is the promoter.

SAVANNAH, AUGUSTA & NORTHERN.—This company, projected from Savannah, Ga., northwest to Rossville, about 330 miles, with a branch from McDuffie County east to Augusta, 30 miles, it is said has sufficient capital to carry out the work, and is now securing the necessary right of way. Contracts for some of the work reported let to W. J. Oliver, Knoxville, Tenn. (March 15, p. 391.)

YANKTON SOUTHERN.—Incorporated last year in South Dakota and recently in Oklahoma, with $100,000 capital, with an office at Yankton, S. Dak. The company proposes to build a line from Yankton south to Galveston, Tex. The incorporators include: F. Hill, T. Lewman, T. B. Paxton, A. Hill, J. W. Warrington and W. C. Proctor, of Cincinnati, O., and R. J. Gamble, W. J. Faulte and I. Piles, of Yankton, S. Dak. (Nov. 23, 1906, p. 146.)

RAILROAD CORPORATION NEWS.

BALTIMORE & OHIO.—Gross earnings for May were $7,370,849, an increase of $553,815; net earnings $2,451,609, an increase of $162,495. Gross earnings for eleven months were $75,047,837, an increase of $4,228,595; net earnings $24,915,596, a decrease of $609,749.

BOSTON, REVERE BEACH & LYNN.—A semi-annual dividend of 3 per cent. has been declared on the $850,000 stock of this road, which has a line from East Boston, Mass., to Lynn, nine miles, and from East Boston to Winthrop, four miles. Connection is made with Boston by ferry. This is at the rate of 6 per cent. a year, the largest paid since 1891, when 7 per cent. was paid. Since that time dividends have been from 2 per cent. to 5½ per cent., the previous dividend, in January, being at the rate of 4 per cent. a year.

CANADA COAL & RAILROAD COMPANY.—See Maritime Coal, Railway & Power Company.

CHESAPEAKE & OHIO.—Potter, Choate & Prentice are offering at par and interest $500,000 one-year 6 per cent. notes dated June 28, 1907. The notes are part of a total issue of $1,200,000.

CHICAGO & ALTON.—The agreement under which the Harriman interests and the Rock Island interests controlled the Board of Directors of the Chicago & Alton in alternate years by taking turns in electing the eleventh director each year, has been dissolved by mutual agreement. The agreement was made in 1904 and was to last until 1914. The Chicago, Rock Island & Pacific is understood to own an absolute majority of the stock, while the Union Pacific owns about 25 per cent. The stock held by both interests has hitherto been deposited with the Central Trust Company.

CHICAGO CITY RAILWAY.—An issue of $10,000,000 5 per cent. bonds has been authorized; of this amount $6,000,000 has been sold to the First National Bank of Chicago and the Harris Trust & Savings Bank of that city. The proceeds are to be used to pay for rails and cars already ordered and other expenses of the first work of rehabilitation. The remaining $4,000,000 will be sold when necessary to finish the work.

CHICAGO, ROCK ISLAND & PACIFIC.—See Chicago & Alton.

CHICAGO SUBWAY.—Officers connected with Armour & Co. have been elected officers and directors of the Illinois Tunnel Company.

CINCINNATI, HAMILTON & DAYTON.—See Pere Marquette.

COLORADO & NORTHWESTERN.—W. B. Hayes, Vice-President, Secretary and Treasurer, has been appointed Receiver of this company, on application of the United States Trust Company of New York. Interest on the $1,000,000 5 per cent. bonds of 1954 has been in default since July, 1905. The road runs from Boulder, Colo., to Ward, 26 miles, and from Sunset to Eldora, 20 miles, with five miles of branches. It has trackage rights over the Colorado & Southern from Boulder into Denver.

CORVALLIS & EASTERN.—See Southern Pacific.

DAYTON, LEBANON & CINCINNATI TERMINAL.—This company has been incorporated with $1,000,000 capital to take over and operate the Dayton, Lebanon & Cincinnati, a steam road which belonged to the Appleyard interests and which was sold under foreclosure in April. It is 23 miles long, running from Lebanon, Ohio, to Lebanon Junction, about four miles east of Dayton; it is planned to extend the road into Dayton.

ERIE.—A loan of $2,000,000 has been negotiated to finish the Genesee River Railroad, which is building a cut-off from Cuba, N. Y., to Hunts. The Genesee River was recently given permission to issue $6,000,000 first mortgage bonds.

FITCHBURG.—Governor Guild, of Massachusetts, has signed a bill authorizing the Fitchburg Railroad to buy the Conway Street Railway, a small electric line in Conway, Franklin County, Mass.

FITZGERALD, OCILLA & BROXTON.—See Ocilla & Valdosta.

GENESEE RIVER RAILROAD.—See Erie.

LEHIGH VALLEY.—On June 19 the regular semi-annual dividend of 2 per cent. and an extra dividend of 1 per cent. on the common stock was declared. This is the same action as was taken six months ago.

MARITIME COAL, RAILWAY & POWER COMPANY.—This company has acquired all the property of the Canada Coal & Railway Company, which consists of 17 square miles of coal lands and 12 miles of road from Maccan Junction, on the Intercolonial Railway, to Joggins Coal Mines. The purchasing company, which was formerly the Maritime Coal & Railway Company, operates, for freight traffic only, three miles of road from Chignecto, N. S., on the Intercolonial, to Maccan Junction.

MARYLAND ELECTRIC.—A semi-annual dividend of 2 per cent. on the $1,133,400 outstanding capital stock has been declared, payable July 1. The first dividend on this stock was 1½ per cent. and was paid last January.

NEW ENGLAND INVESTMENT & SECURITY COMPANY.—This company, the holding company for New York, New Haven & Hartford electric lines in Massachusetts, is to exchange its stock, share for share, for most of the $80,900 stock of the Uxbridge & Blackstone Street Railway, which owns 10 miles of road in and near Uxbridge, Mass.

NEW YORK, ONTARIO & WESTERN.—The New York State Railroad Commission has given this company permission to issue $1,948,000 additional general mortgage 4 per cent. bonds of 1955, to provide for additions and improvements on leased lines and for new equipment. There is already outstanding $2,000,000 of the total authorized issue of $12,000,000.

NORTHERN PACIFIC.—The operation of the Washington & Columbia River will be merged with that of the Northern Pacific beginning at midnight June 30, 1907.

Estimated gross earnings for May were $6,312,160, an increase of $949,984.

OCILLA & VALDOSTA.—The name of this road has been changed to Fitzgerald, Ocilla & Broxton Railroad.

PENNSYLVANIA, NEW JERSEY & NEW YORK.—See Pennsylvania, New York & Long Island.

PENNSYLVANIA, NEW YORK & LONG ISLAND.—A special meeting of the stockholders was held yesterday to act on the proposed consolidation of the company with the Pennsylvania, New Jersey & New York. The Pennsylvania, New Jersey & New York is building the Pennsylvania extension from Harrison, N. J., under the Hudson river as far as the state line, and the other company is building the rest of the tunnel from that point and across New York City and under the East river into Long Island City.

PERE MARQUETTE.—J. P. Morgan & Co. announced on June 19, the following plan for adjustment of the finances of this company, looking to the termination of the receivership. The holders of the $12,000,000 4 per cent. preferred stock are to be asked to subscribe to $5,000,000 5-year 6 per cent. debentures to the extent of 50 per cent. of their holdings. The preferred stockholders are to exchange their present stock for 115 per cent. in new 4 per cent. first preferred stock, which will differ from the present preferred stock in that it will be preferred as to assets and will be cumulative after 1910. New second preferred stock will be issued to present preferred stockholders who do not subscribe to the notes. The proceeds of the notes will be used to refund the company's present floating debt, most of which is in the form of receivers' certificates. The C., H. & D. lease of the Pere Marquette is to be ended. It is said that a new issue of $3,000,000 equipment trust certificates will soon be made to retire maturing equipment notes.

PHILADELPHIA, BALTIMORE & WASHINGTON.—A special meeting of the stockholders has been called for July 31 to authorize an increase in the bonded debt. It is rumored that it is planned to consolidate with the P., B. & W. several other Pennsylvania lines which are now operated under their own organizations in Maryland.

SOUTHERN PACIFIC.—This company has bought, for a price said to be $4,000,000, the Corvallis & Eastern, control of which passed to Harriman interests several months ago. The road runs from Idanha, Ore., to Yaquina, 142 miles, and has outstanding $1,410,000 capital stock and $2,145,000 bonds. It crosses the Southern Pacific at Albany, Ore.

TOLEDO RAILWAY & LIGHT.—This company proposes to increase its capital stock from $12,000,000 to $15,000,000.

UNION PACIFIC.—The stockholders on June 15 authorized $100,000,000 additional common stock and $75,000,000 convertible 4 per cent. 20-year bonds. (May 17, p. 696.)

See Chicago & Alton.

UNITED RAILWAYS INVESTMENT COMPANY OF SAN FRANCISCO.—It is said that the directors have decided to pass the semi-annual dividend, payable in July, on the $15,000,000 5 per cent. preferred stock. The last two semi-annual dividends have been paid in scrip.

UXBRIDGE & BLACKSTONE STREET RAILWAY.—See New England Investment & Security Company.

WASHINGTON & COLUMBIA RIVER.—See Northern Pacific.

WISCONSIN CENTRAL.—The members of the syndicate which last June bought $7,000,000 Superior & Duluth division and terminal first mortgage, 30-year, 4 per cent. bonds, have extended their agreement for one year; it was to expire on July 1, 1907. The bonds, which are part of an authorized issue of $8,500,000, were sold to pay for the extension from Owen, Wis., to Superior and Duluth. Only 75 per cent. has been paid on the bonds, and the syndicate was extended because it was evident that not enough of the road would be finished by July 1, 1907, to warrant the final payment on the bonds by that date.